MILITARY * CIVIL * COMMERCIAL

COMBAT nt Miles Up

...page 14

Illinois U Library



FEB. 1950 25¢

ilot's Report: 1950's Piper



Silk tumbling into empty space, seven hundred fifty bootsoles itching for the impact of solid ground...this is getting down to earth in

Millions of man-hours went into this one the air age! moment of sky-borne drama.

For pilots, it meant careful briefings, weeks of practice, hours flying in formation—plus

long years of flight training... For crewmembers, it meant days of mechanical tune-ups and flight checks—based on a wide-ranging technical aviation background...

For the paratrooper, it meant scores of classroom lectures and demonstrations along with arduous physical conditioning—a perfect coordination of mind and muscle...

For the U.S. Air Force and the U.S. Army, it meant the application of world-wide combat experience, an extensive training program and a complex and efficient system of screening

Getting down to earth is much more than a personnel... routine maneuver. It is human resourcefulness and engineering skill put to the test. It is the triumph of TEAMWORK in the new air age.

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

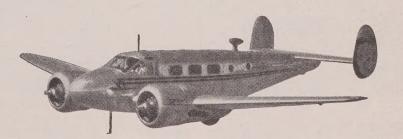


Beechcraft 435

The Beechcraft Bonanza cruises at 170 mph, carries four people in its comfortable cabin. Range is 750 miles; top speed, 184 mph. It combines safety, ruggedness, comfort, economy, speed and performance — is equipped for day, night, and instrument flight.

Beechcraft 18

The twin-engine Beechcraft Executive Transport is relied upon all over the world for fast, dependable performance. This 200-mph plane carries 7 to 9 passengers in luxurious comfort — can be operated readily out of small fields.



They outsold all others

in their respective classes during 1949

Beechcraft

for the TOPS in Performance, Strength, Speed, Style, Safety and Comfort Get the facts about Beechcrafts from one of these friendly Beechcraft Distributors

... and Abroad — ANGOLA—SOREL, Luanda ... ARGENTINA—Will L. Smith, S.A., Buenos Aires ... BELGIUM—Intair, Ltd., Antwerp ... BRAZIL
—Companhia Carnasciali Industria e Comercio, Rio de Janeiro ... CANADA—World Wide Aviation Agencies & Sales, Inc., St. Johns, Quebec ... CHILE—Bunster y
—Dezanilla, Ltda, Santiago ... CHINA—Wah Chang Trading Corporation, Shanghai ... CUBA—Dr. Gustavo S. de Bustemante, Havana ... EGYPT—Misrair,
S.A.E., Cairo ... FRANCE—Victor Helfenberger, S.A. Somatex, Paris ... INDIA—Indamer Co., Ltd., Bombay ... IRAN—Habib Sabet, Teheran
... MEXICO—Jorge Pasquel, Mexico, D.F. ... MOROCCO—Airco, Tanger ... NETHERLANDS—Technische Handelmij, Hollinda N.V., The Hague ...
... MEXICO—Jorge Pasquel, Mexico, D.F. ... MOROCCO—Airco, Tanger ... NETHERLANDS—Technische Handelmij, Hollinda N.V., The Hague ...
... PERU—Inter-Continental Trade Co., S.A., Lima ... PUERTO RICO—West Indies Airways, San Juan ...
SIAM—Siamese Airways Company, Ltd., Bangkok ... SOUTH AFRICA—Aviation Corporation of Africa (Pty) Ltd., Johannesburg ... SWITZERLAND—Groupement
SIAM—Siamese Airways Company, Ltd., Bangkok ... SUTKEY—Kontioto Turkish Company, Ltd., Istanbul ... URUGUAY—Pike and Co., Ltd., Montevideo.

Vol. 9, No. 2, February, 1950, SKYWAYS is published monthly by Henry Publishing Company, 444 Madison Ave., New York 22, N. Y. Printed in U. S. A. Single copy 25 cents. Subscription Prices: U. S., possessions, Canada and Pan-Am, Union, \$7.00 for three years, \$5.00 for two years, \$3.00 for one year; all other countries add \$1.50 per year for postage. Six weeks required for address changes (give both old and new address). Manuscripts, drawings, other material must be accompanied by stamped, self-addressed envelope. SKYWAYS is not responsible for unsolicited material. Reentered as second-class matter April 16, 1948, at the post office at New York, N. Y., under the act of March 3, 1879. Copyright 1950 by Henry Publishing Company.



WHO WILL BE 1950 AEROBATIC CHAMPION?

S. C. Huffman, General Manager of the All-American Air Maneuvers, expects nearly two dozen of the nation's top aerobatic flyers to compete for the Gulf-National Aerobatic Championship Trophy.

This means that last year's 1st place winners-Bevo Howard and Betty Skelton-will find a qualified field of entrants shooting at the titles they now hold.

The Gulf-sponsored contest is open to all—both men and women—on an even basis with no restriction on the type or make of plane used. Qualifying trials will be held at Miami, January 10 to 12. The top ten-point scorers will compete for the title and prizes at the Maneuvers (January 13-15).

A purse of \$3,500—to be split \$1,750 for 1st place, \$875 for 2nd place, \$525 for 3rd place, and \$350 for 4th placeawaits the winners. Judging will behandled by well-known former aerobatic aces.

The way things are shaping up, it looks like the best contest ever. Want to get in? Well, there's still time, but better not wait too long to write to get the contest rules and an official entry blank. A note to All-American Air Maneuvers, Inc., Room 415 Professional Building, Miami, Florida, will bring you complete details by return mail.

HEY . . .

Do you know that water is wet? That night follows day? That 1 and 1 add up to 2?

You do? Well then, here's another fact equally obvious to bright pilots: rings and valves remain free longer, time between overhaul periods can be greatly extended, and engine lubrication is more even and more efficient when you use Gulfpride Aviation Oil—Series D!



Why-because? Because Gulfpride Aviation Oil-Series D-the world's finest detergent dispersant oil for horizontally opposed engines, is the only aviation oil put through Gulf's exclusive Alchlor process. This is the super-important process that removes extra carbon and sludge formers!

LITTLE KNOWN FACTS DEPT.

Question: What's better than inheriting a quadrillion dollars, the key to a Sultan's harem, and being blessed with a spiritual contract that positively provides you with a landing strip whenever and wherever your engine cuts out?

Answer: Obviously, it's a handsome, coveted, engraved-type commission as Perch Pilot.



This fact—with proof—earned a Perch Pilot commission (br) for William E. Wood, of Hudson, Mass.:

"A Beechcraft Bonanza could cruise continuously for over 21/2 days on an equal amount of fuel as that consumed by the X1 in 21/2 minutes!"

See—it's as simple as flying into a mountain peak in a fog. You other Perch Pilot potentials who are spending your days in obscurity, rush your LKF'Swith Proof-to Gulf Aviation Department, Gulf Bldg., Pittsburgh 30, Pa.

Gulf Oil Corporation . . . Gulf Refining Company . . . marketers of



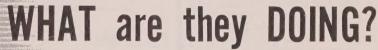












The young men in these pictures are on the jobs for which they trained; good-paying jobs that require skilled hands. Only a few short years ago they only hoped to hold such positions. Study and training was the solution. You can follow in their footsteps. Thousands of new employees are needed in aviation—men with training to build, fly and service the speedier, more powerful and longer-range aircraft. The only limit to your progress in aviation is lack of training and skill.

Spartan can provide the training that will prepare you for a successful career in aviation. Spartan has the shops, the aircraft and equipment, and industry-trained instructors. Your progress is entirely dependent upon your ability to absorb instruction. You train on "live" aircraft. You study exploded assemblies, cut-away models, training films and diagrams that enable you to gain most knowledge in the least possible time. You'll not need MORE than SPARTAN training, you cannot afford to take LESS!

Airlines, manufacturers and airport operators call on Spartan for graduates from this internationally-famous school. The demand is greater than the supply. Get your training NOW—there will be a job for you!



The New Spartan Multi-Engine Maintenance Mechanic and Flight Engineer Course fills a serious need by supplying men of increased training and knowledge of the operation of large, complex aircraft. Write for Special Folder.

SPARTAN A UNIVERSITY OF AVIATION



COLLEGE OF ENGINEERING

TULSA, OKLAHOMA

Maxwell W. Balfour, Director							
Spartan School of Aeronau							
Tulsa, Oklahoma							
Please send your free Catalog immediately.							
Name	Age						
Address							
City	State						
Indicate which of these branches interest							
☐ Flight ☐ Instruments							
Mechanics Aeronautica	0						
Radio Airline Maintenance Engineering							
☐ Meteorology ☐ Management							
Spartan is approved for training und	er the G. I. Bill of Rights						

KING

Coming Up... in SKYWAYS

For those pilots in the northern climes, March is the rugged month that plays a prelude to spring. In some locales it's a good month for flying; in others . . . it's a good month for giving the airplane a going over to make sure it's ready for flying when April and May come along. For those days you spend in the hangar with your Sky Baby, take along a copy of SKYWAYS . . . March issue, that is.

Here's just a bit of the line-up:

- "Pilot's Report: Bellanca Cruise-master," by L. M. Horton. The Bellanca Aircraft Corp., has spent a lot of time and testing in getting this new one ready for the 1950 market. It's a four-placer that boasts exceptional performance, a fast cross-country job powered by 190-hp Lycoming engine that is slated to go on the market for \$9,500. Fly the Cruise-master with your test pilot.
- "Lightplane Mayday—GCA," by Jerry Leichter. In answer to a lot of requests, SKYWAYS had a lightplane pilot try several landings by GCA. The system's advantages and shortcomings for the lightplane operator are disclosed in this one.
- "XF-92A, The Flying Wedge," by Don Downie. The Air Force's newest jet interceptor fighter is this Convair delta-wing plane. Author Downie gets the plane's test pilot to talk about his high-speed aerial charger.
- "Hell in the Cockpit," by Lt. (JG) Hank Searls. Here's what happened when a storm reared up and smacked a PB4Y enroute to its home base of operations.
- "Overload Damage," by Gil Close. Just an ordinary rough landing sometimes causes airplane damage that doesn't show until . . .! A pilot or plane owner with real know-how is the fellow who has learned to recognize the signs of damage caused by overload, and knows what to do about them.
- "X-C". Here and there in the world of aviation, and the people and planes that make today's air news.

These are just a few of the features for the pilot and plane owner who makes sure he gets SKYWAYS.

March Issue

SKYWAYS

Cover: Grumman F9F

	Combat—8 Miles Up Col. N. F. Silsbee Jet plane development calls for new pattern in high-altitude combat							
Pilot's Report: Piper Pacer								
	Whip-Stall Save							
Chain Lightning								
Fly the Hillercopter Don Downie A conventional-plane pilot tries his hand at handling a 'copter								
Make Your Own Shoulder Harness Frank Andrews A private pilot tells how he made his own safety gear for two								
Static Chaser. Jerry Leichter Get full use of your radio by eliminating that needless noise								
USAF Cargo Carrier Douglas C-124 is the Air Force's newest giant cargo carrier								
	Use Your Altimeter Setting Bob Mudge The basis of good navigation can be your altimeter setting	32						
Fly IFR If								
Airport "Extra" Harold Helfer For that needed extra money, try crops on your airport Dilbert Robt. Osborn & Seth Warner "Blind Flying" is staying on VFR when the weather goes IFR								
							Air Your Views 6 X-C	30
	Military Aviation 8 Operational Engnr.	40						
	Hangar Flying 10 CAP News	42						
	Prop Wash 12 CAOA Report	44						
	J. FRED HENRY Editor and Publisher							
(D. N. AHNSTROM Managing Editor STANLEY M. COOK . Production Manager CHARLES W. ADAMS Art Director ARTHUR KAPLAN, Circulation Mgr. (Newsstand) ANNE MASCHKE Asst. Art Director A. E. CARDWELL . Circulation Mgr. (Subs.) ALFRED B. BENNETT . Advertising Manager							

The Henry Publishing Company publishes SKYWAYS at 444 Madison Avenue, New York 22, New York. Advertising Offices: 444 Madison Avenue, New York 22, N. Y.; 6 N. Michigan Ave., Chicago 2, III.; 816 W. 5th Street, Los Angeles 13, Calif. Gordon Simpson, West Coast Manager. William H. Thomas, Chicago Manager.

FEBRUARY 1950

The following publications are combined with SKYWAYS: Air News and Flying Sportsman. All rights to these names are reserved by Henry Publishing Co.

VOLUME 9, NUMBER 2



BELLANCA AIRCRAFT CORPORATION . New Castle, Delaware

... and NOW Aficial



CONTINENTAL

In authorizing the establishment of local passenger, mail and express air service by operators using Continental-powered single-engined planes, the Civil Aeronautics Board has taken official note of a fact known to pilots for years. That fact—the dependability of Continental power—is hammered home every so often by some record-breaking flight like the late Capt. Bill Odom's two long over-water hops, the six-week marathon of Barris and Riedel, or Jongeward's and Woodhouse's six weeks and four days non-stop. Under the exacting requirements of day-in-day-out use, it is being proved constantly by farmers, ranchers, and a growing list of business and industrial concerns, whose planes are business equipment and as such must more than earn their keep. These daily users' experience underscores the champions' advice: fly with Continental power.

CONTINENTAL SERVICE **NEAR AS THE NEAREST AIRPORT**

You're sure of getting there and back, when you fly with a Continental engine. Genuine Continental parts and factory-authorized service are available wherever you go. Continent-wide service backing is another of the reasons why Continental engines are fliers' first choice.



Continental Motors Corporation

AIRCRAFT ENGINE DIVISION MUSKEGON, MICHIGAN



RYOURVIE

C-54 and Hermes

Gentl men:
I "lew C-54's during the war and I think the British "borrowed" the idea of the C-54 for their Handley Page Hermes.
Don't you think there is a close resemblance between the two?

L. ETHERINGTON San Francisco, California

The two planes are similar in appearance. The C-54, however, features a tricycle landing gear while the Hermes has the conventional tail-wheel type. Aside from that, they are very much alike in general app arance.—LD.

Accident Rate

Could you furnish me with information concerning the current accident rate among private flyers in this country?

Englewood, N. J.

Might we suggest that you write the CAB's Bureau of Sajety Investigation for its 1949 Non-Air Carrier Accident Trend Report. It was published on October 19, 1949.—ED.

What happened to the Curtiss XBT2C, Navy torpedo bomber T. MASLOWSKI

Housatonic, Mass.

We aren't quite sure. According to officials of the Curtiss Wright Corporation, they never built an airplane under that designation, and are inclined to believe you may have the designation confused with the Curtiss SB2C Helldiver, one of the Navy's top dive bombers back in 1943. Or, perhaps you're thinking of the Douglas XBT-2C which was an experimental version of the BT-2C basic trainer designed and built by Douglas for the Air Force (then Army Air Corps). At any rate, both the SB2C and the BT-2C went the way of all out-of-date airplanes.—ED.

Meteor 4

Gentlemen:

Gentlemen:
In your December issue you show a picture of a Meteor with afterburners and call it a Gloster Meteor 8. I think it should have been called a Meteor 4. The Meteor 8 has a redesigned tail and, as far as I know, no Meteor 8's have been equipped with afterburners. H. W. SMELTZER

Greensburg, Pa.

Our jet expert salaams in your direction, Mr. Smeltzer. We understand, however, that reheats are being considered for other Meteors.—Ep.

Wheel Landings

Gentlemen:

Gentlemen:

I always read your "Pilot's Reports," but there is one factor which you omit and which many of us pilots would like to know something about. That's the wheel landing characteristics of the new planes you fly. Some of us (like myself) prefer wheel landings most of the time and all of us choose them under certain wind conditions. However, I had to learn from an embarrassing experience that a Super Cruiser is tricky to wheel in with two people in back, or that the excellent little Clipper is the same way if you bring her in under 80 mph, etc.

All good aircraft don't make good wheel land-

ings any more than all good planes make good stall landings. I'm sure many of us would appreci-ate your checking this maneuver for us. T. GRIFFIN

Your editor has advised Pilot Downie of your request for wheel-landing information and we have his word that he will include that information in all subsequent pilot's reports. By the way, we came in on the wheels of a loaded Super Cruiser not too long ago and had no trouble, but maybe it was just luck. You do have to come in a little faster than with a normal three-point landing, however.—Ed.

Stearman

Gentlemen:

Would you please give me the specifications of the Stearman biplane. Was it developed by a pilot by the name of Stearman? When was it in production and when was it discontinued? H. CARLOCK

Everton, Missouri

The Stearman Aircraft Company began building airplanes back in 1930. The company was taken over by Boeing in 1938 and was known thereafter as Boeing, Wichita Division. The primary trainer built for the Air Force kept its name Stearman. These trainers were designated PT-9, -13, -17, -18 and -27 (Navy NS and N2S). In late 1937, another company, Stearman-Hammond was organized, and this company built three models, all two-place monoplanes, in 1937, 38 and 1939. The PT series built by Boeing, Wichita Division were two-place biplanes powered by 220-hp Continental engines and 225-hp Lycomings, and some were sold as war surplus. The founder of the Stearman Company, Lloyd Stearman, was one of our earliest plane designers, particularly racing planes. He was a QB (Quiet Birdman), a racing pilot himself and one of his early racers, the Stearman J-5, made racing history back in the early 1930's. When Boeing took over Stearman Airplane Company in '38, Lloyd Stearman-Hammond with Mr. Dean Hammond. Our last record of Lloyd Stearman, states he is an aviation engineer with the Harvey Machine Company in Los Angeles, California. For further details of Lloyd Stearman, go to your public library and look him up in "Who's Who in Aviation."—Ed.

Engine Info

Gentlemen:

Gentlemen:
I noticed a letter printed in your "Air Your Views" section from Mr. W. R. Corliss. He asked for information on two Menasco engines, the H-4070 and the IV-2040; the Lycoming H-2470 and the P & W H-2600. Perhaps the following will help. will help.

The Menasco IV-2040 and H-4070 were devel-

oped under Navy Department contract. The IV-2040 was a 12-cylinder aircooled engined designed to produce 2,000 hp. It was dropped prior to block testing in favor of the H-4070 which was a 24-cylinder, H, aircooled design for 3,400 hp. Both engines were discontinued prior to completion.

Both engines were discontinued prior to completion.

The Lycoming H-2470 was a 24-cylinder, H, liquid-cooled design started in 1939. It was first run in June, 1940, and developed 1730 hp. This was increased to 2,000 hp a year later.

The Vultee XP-54 carried the H-2470 in 1942 and it was then developing 2300 hp at 3300 rpm. This engine was discontinued in April, 1943.

The P & W H-2600 was a 16-cylinder liquid-cooled design consisting of four banks of four cylinders each, and was designed to produce 1700 bhp. It was dropped in 1942.

A. D. WALKER

Manhattan Beach, Calif.

A. D. WALKER



Aeronautical Engineers are pushing ever upward the curve of aircraft performance and air transportation. Aviation depends on engineers...and their profession...for its constant and amazing achievements and growth. A career in Aeronautical Engineering—the key division of Aviation—can be YOUR personal plan for progress.

Here is a career of lifelong adventure...for YOU...in the great Air Age. Besides fascinating work, you enjoy these rich rewards - good pay from the start...wide-open opportunity for quick advancement...putting your own original ideas into action...the security of a big, growing industry. And in Aeronautical Engineering, whether you are creative or practical by nature, there is a place for your particular talents and ability.

Start the upward "curve" of YOUR plan for progress ...with Northrop training. You are already IN aviation when you train at Northrop. You enjoy big advantages that have won choice jobs for graduates with ALL leading aircraft manufacturers and airlines. Get the full story, in the big

> illustrated Institute catalog. Classes start every 8 weeks - you can start YOUR training soon.

instruction in principles and operation

of latest types of aircraft power plants.

Experience duplicating every-day engineering duties in aircraft plants is an important advantage of NAI training. These students are testing a nose wheel installation for braking effects, in the Institute "test lab."



FOR THIS CATALOG-SEND COUPON NOW

Vorthrop, Aeronautical nstitute

1521 EAST BROADWAY, HAWTHORNE, LOS ANGELES COUNTY, CALIFORNIA

Division of Northrop Aircraft, Inc. James L. McKinley, Managing Director

Veterans Administration — Engineers' Council for approvals Administration—National Council of Technical Schools
—California State Beauty File Professional Development-Civil Aeronautics -California State Board of Education — U. S. Dept. of Justice, Immigration and Naturalization Service

NORTHROP AERONAUTICAL INSTITUTE 1521 E. Broadway, Hawthorne, Los Angeles County, Calif. Please send information on opportunities in Aeronautical Engineering, your catalog, and starting dates of classes. I am interested in:

Aeronautical Engineering • Aircraft & Engin

	and mechanics
NAME	
	AGE
ADDRESS	

Check one: VETERAN ZONE STATE NON-VETERAN

highest

MILITARY AVIATION

THE USAF'S XB-51 is equipped with a parachute for quick stops. Stowed aft, the chute is released via control in the cockpit. The XB-51 is the Air Force's only (so far) three-jet bomber primarily intended for ground support action. Another bit of "extra equipment" is JATO for short-field getaways.

GRUMMAN PANTHERS are now equipped with a stall instrumentation system developed by Safe Flight Instrument Corp. This system in the Grumman *Panther* incorporates the recently developed Safe Flight control stickshaker as advanced warning of an impending stall.

AIR FORCE is now taking delivery of new longer range Boeing B-50's, the latest in the *Super-Fort* series. Top speed of the B-50 is over 400 mph, gross weight is 164,500 pounds and its range is more than 6,000 miles with a full load. A total of 222 B-50's are on order.

NAVY expects new sweptwing jet fighters this year: the Grumman F1OF, the Douglas F4D, and McDonnell F3H. Others expected are Douglas A2D turboprop attack plane, and North American A2J, also turboprop.

NORTH AMERICAN Sabre fighters (F-86) are now being fitted with eight five-inch rockets. Its standard armament is six 50-cal. machine guns mounted on both sides of nose air intake. Another version of the Sabre will be a night fighter, with the nose housing radar equipment, and the air intakes on the side of the fuselage.

SKI LANDING GEAR installations made by Federal Aircraft Co., of Minneapolis, are being provided for the Northrop C-125A

and YC-125B Raiders being groomed for Arctic rescue operations.

UNOFFICIAL DISTANCE RECORD for helicopters was established by a Navy Sikorsky helicopter recently when it flew 712 non-stop miles between Seattle and Alameda. The USAF set the old record of 703.6 miles in 1946. The Navy helicopter was in the air for 10 hours and 17 minutes.

CAL TECH'S hypersonic wind tunnel in Pasadena, California, is geared to test speeds up to 7600 mph. Guided missiles, of course, not aircraft.

BOEING is readying a mockup of its new jet bomber, the XB-52. An Air Force contract for 10 XB-52's is expected after two experimental planes have been built.

FIRE SUIT has been developed which will withstand temperature of more than 2,000° F. Developed and successfully tested by the Navy, this suit will enable the wearer to walk unharmed through fire and remain in 180° F live steam for several minutes. Suit weighs only 35 pounds, and this includes oxygen breathing apparatus.

NATIONAL GUARD units are now being equipped with F-84 *Thunderjets* to replace the old and trusty F-47's. Air Force fighter groups are getting North American *Sabres* (F-86A's).

OFFICIALS in high places are wondering out loud why our air power is being cut back while nations of Europe are working fast to build up their air power. There are many who claim the U. S. position will

soon be a tail-ender *if* the President and Defense Secretary Johnson continue cutting back the Air Force and shrinking the Navy.

FLYING TECHNIQUE recently saved a Marine fighter plane from extensive damage. The pilot with the know-how was from the Marine Fighter Squadron 212 of the Second Marine Aircraft Wing.

Capt. Pete Tonnema, Air Group 14, was flying an F4U-4 on a training mission off the deck of the carrier U.S.S. Palau (CVE-122). Soon after the take-off Capt. Tonnema noticed his hydraulic pressure had dropped to zero. After an exchange of messages, Tonnema was ordered to land at the Naval Air Station at Guantanamo Bay, Cuba, a short distance from the scene of carrier operations.

Nearing the NAS, Tonnema called the Tower and was given landing instructions which included his trying to pop the gear with a CO₂ bottle. Capt. Tonnema tried the CO₂, but only one wheel dropped into the locked position. The Captain climbed back upstairs and then went through a series of aerobatic maneuvers to get the other wheel down and locked, but . . . that didn't work. Only one trick remained to be tried, and Tonnema tried it.

While maintaining a flying speed of 90 knots, Capt. Tonnema made four passes at the runway, bouncing on his down-andlocked wheel once on each pass. The faulty gear finally came down but wouldn't turn into position and lock. With his gas running low, Tonnema climbed back upstairs over the water, dropped his auxiliary fuel tank, then came back down for a final try. Coming in, the Captain touched his locked wheel down first, then at stalling speed touched the other wheel down. On contact, it turned and locked into position as nice as could be. Capt. Tonnema rolled the ship to a stop, climbed out and headed for the Officers Club for a tonic to calm his somewhat jangled nerves.

AIR FORCE'S new bomber, XB-51, gets a faster stop, thanks to a unique parachute braking technique. JATO is for quick take-offs



-PLANE --FAX

Quick picture of

PALO ALTO AIRPORT Calif.

One of U.S.'s oldest private airports licensed by CAA to repair planes and engines • Air Search and Rescue • Headquarters, Palo Alto School of Aviation • Paved runways, lighted on request • Modern Standard Service equipment, trained attendants, Chevron gas, RPM oil and greases.

How airport owners help pilots keep costs down

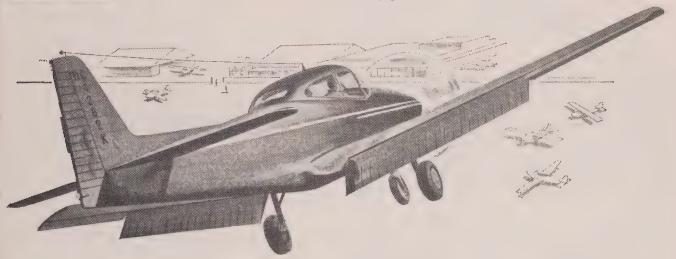


Jack Nystrom, Superintendent of Maintenance of Palo Alto Airport, has started all planes at his field on RPM Aviation Oil "because it keeps engines running cleaner and freer, and cuts costs by reducing wear on vital parts. We use 'RPM' in our 16 Navions based at the field and in 115 ad-

ditional Navions that fly into the field for service and repair work.

"One Continental E-185 was inspected after 1100 hours. The amount of engine wear was negligible, and the rings and valves were in excellent condition. The internal parts required only a washing off with a solvent.

"We feel that RPM Aviation Oil has done us a great service. And we will be only too glad to have you inspect any of our airplane engines when we tear them down so that you can see for yourselves what a really good oil can do."





Tips of the Month "Let's get rid of 'pilot error'"

"These rules are fundamental—but easy to forget. They make flying safer—and more fun.

- 1. Keep the plane clean
 inside and out.
- 2. Watch the load factor don't overload.
- 3. Follow the preventive maintenance schedule.
- 4. Don't hedge-hop.

 You may do it only once!"

Jack Nystrom, Supt. of Maintenance, Palo Alto Airport

Pilots now request new Chevron 80/87 Gasoline—enjoy more power, smoother take-offs

"Everybody at the field has been asking for the new Chevron 80/87 Gasoline," writes Mr. Nystrom, "and we've had very good comments from all the pilots—many of whom had been using other brand fuels. We've found that it ends take-off knocking and pre-ignition, and gives us more power than the old 80 octane gasoline. It's a particularly good deal for the pilots who had been using 91/98 gasoline—because Chevron 80/87 costs less and saves them money."





SIGNS OF THE TIMES—This stripped down BT-13 is signpost for Banning (Calif.) airport

HANGAR FLYING

Bellanca Cruisemaster

The first production model of the new four-place Bellanca Cruisemaster took to the air recently. Pilots who have flown it "secretly" claim it'll grab a lot of the spotlight from other four-placers in the 190-hp class. Powered by Lycoming engine, the Cruisemaster has an advertised cruising of 180 mph at 70 per cent of power. Standard radio is Mitchell VHF Avigator with VHF transmitter-receiver, low-frequency receiver, homing loop. Prop is the Aeromatic. Fuel capacity, 40 gallons.

Piper Brigadier

Piper Aircraft Company at Lock Haven, Pa., has purchased the Serial 1 Brigadier Model B-250 from the Baumann Aircraft Corporation. "Experimental purposes" is reason given for the purchase. The Baumann Corp., is currently pushing construction of its Model B-290, a five-place, all-metal twinengine (Continental C-145's) pusher monoplane with a cruising speed of 160 mph, range of 750 miles. A station wagon version will also be marketed. Standard executive Brigadier 290 is expected to sell for about \$20,000.00 and will be marketed during summer of 1950. Piper plans to power its version of the Brigadier by two 190-hp Lycoming engines in tractor rather than pusher position. Modifications will also include raising the wing, enlarging the luggage compartment and lengthening the tail. It is expected to cruise at 165 mph.

Refueling Warning

Ground aircraft before refueling! According to a report from Flight Safety Foundation, novices in the flying game are inclined to scoff at the necessity for grounding aircraft before refueling or at other times. Let this be a warning—there is a case on record where a mechanic going to service a plane touched it and was knocked on his back.

He was completely out for several hours and lost his hearing for several days. Periodic checks of grounding equipment at refueling pits should be carefully made to insure adequate static grounding at all times. Rusty, grease-covered or frayed grounding wire connections are no good. Don't trust 'em.

Airplane Show

The New York Airplane Show is scheduled at Grand Central Palace, New York City, for February 18 through 26. Last year's show brought praise from all quarters, and this year's show is expected to be as good if not better. There will be a representative showing of U. S. personal planes and equipment. As last year, the Airplane Show is a part of the larger National Sportsmen's Show.

Super Navion

Within the next six or eight weeks, Ryan Aeronautical Corporation expects to start delivery of its new 260-hp Navion. Exter-

nally similar to the 205-hp (Continental) Navion, the new Super powered by a Lycoming engine will cruise at 170 mph and have a normal range of 640 miles. The super will sell for less than \$14,000 completely equipped, while the Continental-powered Navion will continue at its present \$10,965 figure.

Aeronca Helioplane

Now that refinancing arrangements have been completed that will put the Aeronca Aircraft Corp., Middletown, Ohio, into the black, the company is dickering with Lynn Bollinger for licensing rights to the forthcoming four-place *Helioplane*, development of which is underway at the Norwood, Mass., base of Helio Corp.

Airport Facilities

If you're planning to fly to Miami for this year's All American Air Maneuvers (January 13 to 15), here are airport facilities for visiting aircraft:

Tamiami Airport: Unlimited tie-down space available, some shelter. Owner must provide own stakes and rope. No fee. Both 80 and 91 octane gasoline, major and minor repair service. Night operation on notice. Courtesy transportation to end of Miami Transit bus line on Southwest Eighth Street. Hard-surfaced runways. Pete Smith, Mgr.

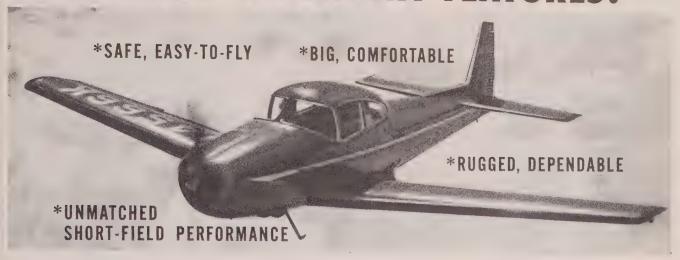
Sunny South Airport: Easily accessible, Tie-down space for 400 lightplanes. No hangar. Daily charge of \$1.00, 24-hour guard guaranteed. Stakes provided, but 50-foot lengths of rope on sale at \$1.00 which will be refunded when rope is returned. All planes participating in Miami-Havana Air Cruise (January 16, 17) will be directed to this field. Both 80 and 91 octane gasoline, major and minor repairs. Night operation on notice. Bus and U-Drive-It transportation available at door. Grass field 4.000 feet with single 1,000-foot paved take-off strip and paved taxiway. Bob Uricho, Jr., Manager.

Opa Locka Airport: This field is recommended for all multi-engine aircraft. Complete facilities are available, but other private aircraft are urged to use other fields to keep traffic at Opa Locka at a minimum before and after the show. Those using the airport will be charged \$1.50 per day. Control tower will be in operation during daylight hours only from January 10 through January 16. Frequency not yet available.



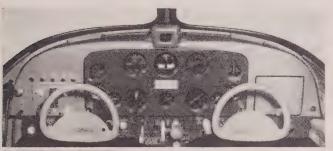
STUDENT PLANE—Students of Brazilian school of aviation built this all-wood single-placer

ONLY RYAN NAVION GIVES YOU ALL OF THESE IMPORTANT FEATURES!



WHAT YOU WANT MOST in a plane today is fast, over-150-mph cruising without sacrificing easy, safe flying or ability to land under 50 mph with average loads. You

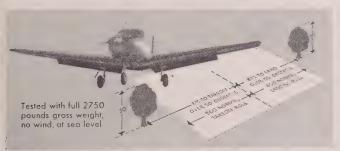
want room aplenty for four big people and lots of luggage. You want a rugged ship for hard work, and traveling usefulness not limited by short, unimproved fields.



*SAFE, EASY-TO-FLY You don't want temperament, or tail-waggle even in rough air. *Navion* flying is confident, relaxed flying! Exclusive interconnected rudder and aileron give "two-control after take-off."



*BIG, COMFORTABLE Change seats in flight to see how spacious the *Navion* is. No rear blind spot restricts your visibility. And the *Navion* is completely sound-insulated and "air-conditioned."



*UNMATCHED SHORT FIELD PERFORMANCE 205 hp engine gives 900-ft. altitude the first minute. Full-deflection flaps set your *Navion* down short for a smooth roll on larger wheels. Steer the nosewheel.



*RUGGED, DEPENDABLE Pound Navion's rhino-thick skin with your fist...examine those sturdy "built like a bridge" wings...compare that husky landing gear. Give it a mauling hard ride on roughest ground!

Ryan Mavion

NO OTHER PLANE COMBINES SO MANY FEATURES SO WELL

YOURS WITHOUT EXTRA COST:

- 1. High gloss synthetic enamel finish overall
- 2. Dual fuel system with electric pump
- 3. Dual control wheels and brakes
- 4. VHF radio for distant contacts
- Individually adjustable front seats
- 6. Canopy that permits exit from both sides

Metal propeller (extra)
WRITE FOR BOOKLET AND DEMONSTRATION

Rely on Ryan aeronautical company, 202 lindbergh field, san diego 12, california

A.R.C.'s VHF Communication and Navigation Equipment is a

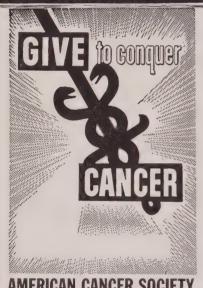
REVELATION

Get static-free communication and the added reliability of omni range navigation with A. R. C.'s Type 17 2-way VHF Communication and Type 15B Omni Range Navigation Equipment. With the 15B tuned to VHF omni stations, you fly directly in less time. You can receive weather broadcasts simultaneously with navigation signals—static free! It simplifies navigation and gives long, trouble-free life. The Type 17 adds an independent communication system for use while the 15B is providing navigational information. Installations for both single and multi-engined planes are made only Get static-free communication and the multi-engined planes are made only by authorized



All A.R.C. airborne equipment is Type Certificated by CAA. It is designed for reliability and performance—not to meet a price. Write for further details or name of your nearest A.R.C. representative.

Aircraft Kadio Corporation BOONTON, NEW JERSEY



AMERICAN CANCER SOCIETY



Oddities Aero

Rank Buster. Naval aviator during war ran afoul of regulations, remained Ensign despite fact he was one of NATS' top pilots. On one trip with plane load of senior officers, a Lieutenant took advantage of fact the pilot was junior officer and made nuisance of himself on already crowded flight deck. After several unsuccessful attempts to tactfully remove land-lubber Lieutenant, the plane's crew decided on drastic action. By pre-arrangement, crew members, one by one, slipped out, finally leaving Lieutenant and Ensign alone on flight deck. Ensign put the plane on auto pilot, then he too sneaked out. When Lieutenant finally stopped talking long enough to realize he was alone and no one was at controls, he fled from deck, started frantic search for crew members. When he found them having chow in galley, he was speechless and could only point shakily toward cockpit. He then slumped into seat and remained there for rest of the flight. (R. E. Forman, Atlantic, Va.)

X-Ray Eyes. Seagulls at Australian flying boat base can spot a fourengined Sandringham airliner from miles out. Even though there is no visible difference between Sandringham and Hythe flying boats, the seagulls know which is which and always fly wing in greeting to Sandringhams. Reason for fondness is that maintenance men on Sandringham throw scraps of food overboard when plane is in for servicing. Hythes carry no food. (E. E. Gentry, Marthaville, La.)

Modern Age. Employees of Ray's drive-in at Sparks, Nevada, were taken aback recently when two young men landed helicopter outside the restaurant, waved to waitress for service. ordered two milkshakes, drank them. then took off again after waitress had removed service tray. Men were delivering helicopter from California to Utah. (C. V. McAvoy, Reno, Nevada.)

Entree. Private pilot Frank Baker and passenger landed lightplane in farmer's field, walked across road to visit a friend. When they returned to plane hour later, Baker discovered pigs had deserted their alfalfa meal and consumed most of fabric from plane's fuselage. Baker and passenger went home by bus. (C. Markey, Chillicothe, Missouri.)

Spot Landing. It happened on carrier U.S.S. Roosevelt just after World War II. Plane pushers were told to park an incoming SB2C in forward port corner of flight deck. Few minutes later, plane came in on final approach, received "cut" signal from LSO. Landing looked beautiful but at last moment SB2C zoomed over barrier cables, plunked down on forward portion of flight deck, skidded to forward port corner, came to abrupt stop at exact spot pushers had been told to park it! (C. E. Dairs, Torrington, Conn.)

Two Left Feet. Lanky student with 10 hours solo time took off for first solo flight in side-by-side ship. Take-off was ragged, plane made wide turn at 100 feet, came in crosswind and groundlooped, damaging wing tips. Shaken student maintained rudder control cables were fouled. Instructor pointed out student's feet were on both left pedals. (G. H. Knox, Indianapolis.)

Att'n Readers:

If you have any news note oddities pertaining to aviation, send them to SKYWAYS, Box 17, 444 Madison Avenue, New York 22, N. Y. Five dollars will be paid the sender of each "oddity" printed. Contributions cannot be returned unless accompanied by stamped addressed envelope. The decision of the editors is final.

Add Skyways to your permanent library!

One-year's subscription to SKYWAYS and a handsome book-shelf binder all

for just \$5.00

Here is your opportunity to have aviation facts and figures at your fingertips.

Lach issue of Skyways represents a new chapter in aviation development. Bound together in this sturdy, book-shelf sized portfolio, a year's subscription to Skyways becomes a permanent record of aviation history. Send today for your

2-50

STORES

own Skyways binder, in durable, attractive blue leatherette, embossed with gold. This month's special double-offer means that you get not only the binder but also one year's subscription to Skyways for a mere \$5.00.

Fill in this coupon and mail today

	☐ Renewal		al	☐ New			
SKYWAYS		☐ I year	SKYWAYS	and	binder\$5.	00	
444 Madison Avenue		2 year	s SKYWAYS	and	binder 7.	00	
New York 22, N. Y.		☐ 3 year	s SKYWAYS	and	binder 8.	00	
Gentlemen:							
l enclose \$	for a binder	and SKYV	VAYS for		years.		
Name						_	
Address							
City		Zone _		State			





AIR FORCE'S recently developed all-weather fighter, Northrop F-89 Scorpion, is the only jet thus far equipped to carry the new Firebird air-to-air missiles

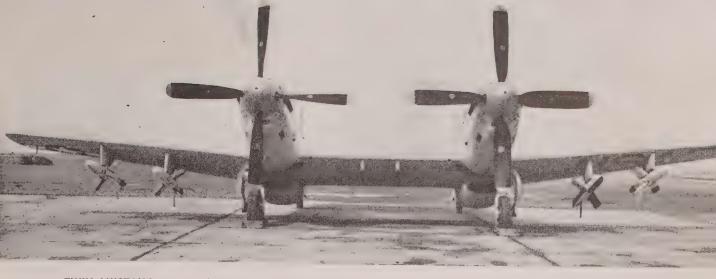


TESTS to study pilot reaction to ejection from high-speed jet aircraft (left) are a Navy project

LOCKHEED F-90 is one of first interceptor fighters to be developed for Air Force. It features long range, fast climb

Combat... 8 Miles Up

By COL. N. F. SILSBEE



TWIN MUSTANG is presently being used to test Ryan's new Firebird missiles, the first air-to-air guided missile

to be developed. The Firebird is a rocket-propelled fragmentation shell which "homes in" on its target by radar



REPUBLIC XF-91, powered by GE J-47 and rocket unit, is also an interceptor. It gets to 60,000 feet in a few minutes



AIR NAVY'S first all-jet operational squadron was equipped with McDonnell FH-I *Phantoms*. Newer jets such as the McDonnell *Banshee* now are being flown off Navy carriers

If there is another war, the decisive air battles will be fought at altitudes of 40,000 to 45,000 feet. This is not only the firm belief and established policy of the U.S. Air Force and Naval Air Arm, but such top-level agencies as the Research and Development Board, Weapons Systems Evaluation Group and the Joint Chiefs of Staff are equally convinced. They have launched an all-out program of development to increase the speed and ceiling of our bombers; the speed, rate of climb and maneuverability of our fighters; and the ability of turbojets to operate more efficiently in the cold, thin upper air, along with a hundred other problems relating to equipment. Also being studied are ways

and means for pilots and aircrewmen to function at those dizzy heights. In addition to all this, a program of almost fantastic proportions is under way for the next stage beyond air combat—the pilotless guided missile.

It is one thing to fly our improved jets eight or nine miles above the earth's surface, but it is something entirely different to fight with them at such altitudes. It comes down to a simple question: How high and how fast can we fight?

The answers are far from simple. First let's take a look at some of the conditions encountered in altitudes of from 40,000 to 50,000 feet. Our practical knowledge of this region (Continued on page 43)



PIPER PACER is the 1950 version of the popular four-place Clipper. Powered by 125-hp Lycoming, it cruises at 123 mph

Pilot's Report... Piper Pacer

JUST off the production line in time for the 1950 Miami All American Air Maneu-

vers, the first 52 PA-20 Pacers will leave Lock Haven, Pa., January 10th for the first public showing of the newest Piper entry in the low-cost (\$3,000 to \$3500) family-airplane field. Offshoot of the Clipper, the Pacer features higher horsepower, new "Hydrasorb" landing gear, flaps, better soundproofing, and relocation of the gas tank from behind the instrument panel to the wings. Actually, the greater portion of the Pacer's features are "customer blueprinted" as a result of Piper's forthright questionnaire sent to all Clipper owners.

Compiling the likes and gripes of its customers, it was clear to Piper that the Stall Warning Indi-

By GLORIA HEATH

cator is in to stay, that no more than a 6- or 7-gph fuel consumption is desirable, and

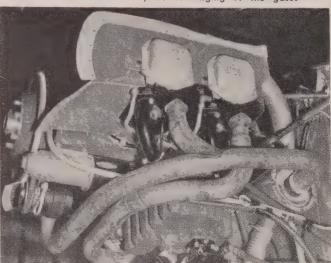
that a wheel-type control is in vogue for the added roominess it affords over the stick type.

How Piper can deliver the finished market product at low cost can be seen by following an airplane through the production line. On a visit to the factory to report on the *Pacer*, I started from the Sales Department where the indicated changes from the questionnaires were compiled, through Tony and Pug Piper's office where the engineering data for the airplane was drawn up, on to the plant itself. At the factory you're apt to run into "Bill" Piper's sons at most any point in the line as the *Pacer* is their baby. Explaining (*Continued on page 18*)

CABIN of Pacer features wheel controls instead of usual stick control. Panel allows room for extra instruments

ENGINE installation features the new cross-over exhaust which allows a more complete scavenging of the gases





16



TIE RODS from horizontal stabilizer to vertical are an addition to the Pacer. All new features were customer-requested

FLAPS are the three-position type: up, one-half and full (as shown in this photo). Another "new" is landing gear

17





HYDRASORB OLEO and shock cord landing gear installation makes rough-field landings in new Piper safe and easy

how the four-place airplane price can be kept down to the \$3,000 level, Tony stressed 1) the use of parts interchangeable with other models, 2) reducing size-building from the cockpit out so that comfort is afforded without unnecessary space provisions, and 3) simple construction to cut labor cost—with basic structure giving the "lines," rather than adding extra framework to please the eye.

That Piper has stuck to this simplicity in construction is evident in watching the airplane being put together in the factory. Aluminum strips, partly formed as spars, start the wing structure which is composed of wooden bow, aluminum leading edge, and steel drag wires. Fabric covers the wing which is externally braced by a V strut. Control surfaces are metal frame, fabric covered. Steel tubing is shipped into the factory in lengths that require only trimming before being welded to form the fuselage structure. The door framework is cut to a minimum by providing two small doors—the rear door on the left side of the airplane, and entry to the front by the right side.

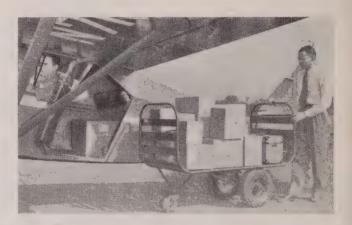
At the end of the hangar, off the production line, is the test section where Jay Myers, chief pilot on the *Pacer* program, has been running 170 hours of shake-down flights. With the increase to 125 hp from the 115 hp of the *Clipper*, a good part of Jay's testing has been on the oil-cooler installation found necessary on the *Pacer*. The Lycoming 0290 D engine has the cross-over exhaust, a unique feature of recent Piper aircraft. The cross-over exhaust is a means of increasing the fuel-air charge, hence the power, in the cylinders by reducing the back-up pressure. More complete scavenging of the exhaust gases is possible by this means with the exhaust never being carried off on the side that is firing.

In a quick walk around the ship for a pre-flight, Jay pointed out the newer features of the *Pacer*. From the outside the ship resembles the *Clipper* in general appearance. Additions are tie *rods* from the horizontal to vertical stabilizer, balanced elevators, and an 18-gallon fuel tank in each wing, with

the indicators below the tanks. Future Owners Please Note: Placard your gas-selector switch and panel clearly that left tank is to be used for take-off. Not equipped with an outlet in the rear, the right tank will feed properly (depending on amount of gas in tank) only when the plane is in level-flight position. It was a good move to relocate the tanks in the wing from their former position in the cabin behind the panel, but further improvement—that of relieving the pilot from the burden of fuel tank management hazards—could be made.

Checking the interior of the cabin prior to take-off for our flight, Jay pointed out the removable seat installation in the rear. With keyhole slots front and back, the seat eases out in a few seconds and the space can be used for stowing baggage or freight loads. This is in addition to a baggage compartment, and it definitely extends the utility of this family airplane.

To secure the airplane (Continued on page 49)



REAR SEAT of the new *Pacer* is quickly removable, thus permitting its transformation from passenger-carrying airplane to a cargo carrier. Cabin door on left is at rear, while the door on right side opens to the *Pacer*'s front seat





FLIGHT INSPECTOR Nogard shows how the seat cushion became lodged between vertical fin and rudder overhang

Whip-Stall Save

By A. J. NOGARD

Aviation Safety, CAA

Dulin and I were sitting in the CAA Aviation Safety Office at Wings Field, Ambler (Pa.), battling the usual amount of paper work when the phone rang. It was a call from Jake Arner, Chief Pilot of Lehigh Aircraft Company at Allentown-Bethlehem Municipal Airport. Jake reported he had a group of secondary flight-instructor students ready for flight testing, so I agreed to fly up the following day to give the necessary flight tests.

The CAA's Waco NC 154 was rolled out of the hangar early the next morning and within a short time I was up and away, bound for Allentown, Pa. When, some minutes later, the Waco was braked to a stop at the Allentown field, Jake Arner came out to meet me and announced the students had gathered and were then deep in the throes of the oral exam which precedes the flight test. While the students were finishing up that first part of their examination, Jake and I did a bit of hangar flying, then we had the Lehigh NC 30112 Waco rolled up to the gas line and her tanks topped. I scheduled the first student for his flight test right after lunch.

It was just about 1:30 p.m. when the student and I, each carrying a 'chute, walked over to NC 30112. After giving the ship the usual preflight, the student and I took off for an acrobatic check ride. How well I remember it . . . it was another beautiful day with excellent visibility. This degree of visibility was somewhat unusual for the Lehigh Valley because of the many cement (Continued on page 54)

FLIGHT TEST for secondary flight-instructor student gave A. J. Nogard a ride he won't forget. A slow roll almost got him 19







4. To help sell JA-3 to Gov't, and for cash for himself, Brennan makes over-the-pole trip from Nome to Washington in JA-3 at speeds of 1600 mph and at 90,000 feet, Plane's cabin is pressurized and Brennan wears an high-altitude suit

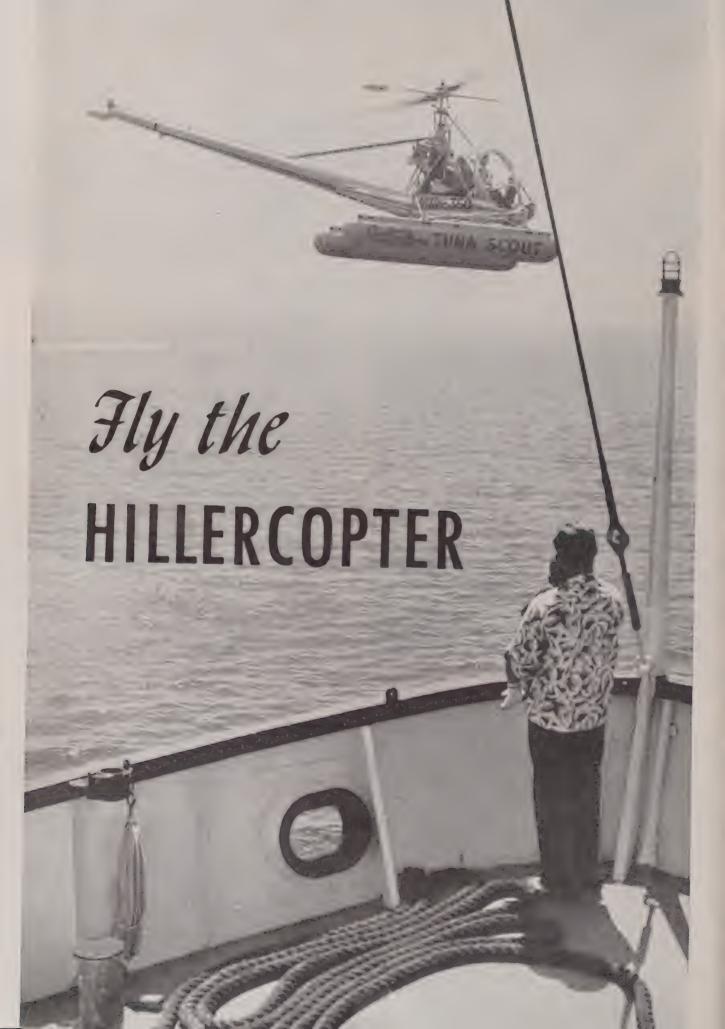
5. Nearing Washington at end of history-making flight, JA-3 runs out of gas, but Brennan makes it to airport. Landing speed is very high, so Brennan brakes jet plane to a stop by releasing parachutes housed at tail. Gov't buys the airplane



op honors in the field of aviation motion pictures belong to Warner Bros.' "Chain Light-I ning." It's the story of a B-17 pilot (Humphrey Bogart) who takes a job as test pilot after war and flies a very high-speed jet plane on breathtaking X-C that ends in Washington, D. C., and then tests a life-saving pod in a bail-out from jet plane at over 60,000 feet. The picture gives a very real glimpse of aviation tomorrow when speeds of over 1200 mph at more than 60,000 feet will be a reality. Credit belongs to Major K. Chilstrom, executive officer at Wright Field, who was one of the technical advisers and whose strong hand of authenticity is clearly evident throughout the film. Top military men will admit there is nothing unreasonable or fantastic in the film's story of high-speed developments. Don't miss it if you want 90 minutes of pure aviation.

6. Back at Willis Co. in California, Brennan tests pod in bailout from stratosphere at high speed, proves it successful idea







HILLER 360 climbed to a thousand feet over tide flats near Dunbarton Bridge, Palo Alto, California, at 800 feet per minute

By DON DOWNIE

T's a giant yoyo built for three with a 10,000-foot string. Up or down, sideways or backwards, you call the shot and it'll perform. Just about every non-flyer we know seems to be waiting for the day when he can have a helicopter parked atop his garage. They envision rotary-winged planes popping up from residential areas like whirling yoyos to take their owners to work or play.

Quite obviously that day is still well in the future, but helicopters are now for sale that almost any dub can fly with a few hours' instruction. And for something new and different in aviation, try flying a helicopter.

For an unusual SKYWAYS' pilot report, come along as C. L. Washburn, ex-PBY pilot, unfolds the many mysteries of vertical flight. Since Mr. Washburn is special assistant to 26-year-old Stanley Hiller, Jr., President of United Helicopters, our ship was naturally a Hiller "360."

Flights took place at the Palo Alto factory of United Helicopters just south of San Francisco on a blustry winter day that was not particularly ideal for hovering and vertical landings. Our Hiller "360" was N8105H, a factory demonstrator that was being used at the time for experimental work on new engine instruments.

Just about everything at this new Palo Alto factory is unconventional. Starting with its youthful



ROTOR BLADES used on Hillercopter are made of laminated spruce with leading edges covered with metal, remaining part covered with fibre-glass. Check pilot for Author Downie was Mr. C. L. Washburn (above) an ex-Navy PBY pilot



TUNA FISHERMEN experimented with 'copter as scout for locating schools of tuna. Operation was called "successful"

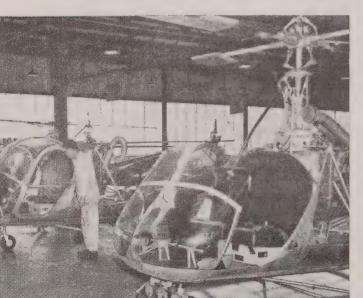


UNITED HELICOPTER President Stanley Hiller Jr. proudly displays headlines of a 'copter rescue to author and his wife

president, the average age of the hundred-odd employees is less than 30. The factory is actually an assembly plant since the main parts for the ship are constructed at over a hundred different plants on a contract basis with a quality-guarantee bond to assure perfect workmanship. At present three completed Hillers are rolling out the factory doors each week. To date over 30 planes have been delivered, many of them to buyers as far afield as Africa, Venezuela, France and Switzerland.

No matter how much flying time a pilot has tucked away in his log books, a high-flying eggbeater will make him sit up and say "Uncle" for the first couple of hours of instruction. Rotarywinged aircraft fly just differently enough from a conventional plane to give a newcomer that same maddening frustration he felt during his first few hours in a conventional airplane. It'll make you feel humble and that's not a bad idea for any pilot

PRODUCTION at factory is geared to three complete 'copters per week. Note landing lights on 'copter in foreground





SERVO-TAB ROTORS, 12-inch by 16-inch airfoils, control the *Hillercopter's* $17\frac{1}{2}$ -foot main blades. The servo-tab rotors are operated via simple over-head control stick. Pitch control (below) is mounted between seats in the "open cockpit"



who has long ago forgotten that the secret of flight takes a little learning.

"The less you know about flying, the better off you are for the first couple of hours in a helicopter," explained Stanley Hiller. "For the first two hours, a complete greenhorn does a much better job than a trained fixed-wing pilot, because the newcomer will do exactly what the instructor tells him without stopping to wonder why. An experienced pilot, on the other hand, has a great deal of trouble in unlearning some of his regular training.

"When you're ac- (Continued on page 48)





SHOULDER HARNESS, homemade, is shown here (above) worn by Author Frank Andrews and Mrs. Andrews

SAFETY BELTS from a Cub headed for scrap were bought for a dollar, made into "Sam Brown" harness

BELTS for pilot and passengers were fastened at one end to the center ring between the Ercoupe seats (right)



Make Your Own Shoulder Harness

Several months ago, my wife and I heard about a shoulder harness that had been developed for use

in a lightplane. "That's for us," we shouted . . . until we were told how much the outfit cost. It was a plain and simple fact—the budget just couldn't take it.

However, even though we couldn't afford to buy a readymade shoulder harness, we decided our little *Ercoupe* was not going to be without a set. A friend who'd suffered head injuries in an emergency landing—injuries that would not have occurred if he'd worn a shoulder harness—had convinced us of the necessity of such an installation. So we did the only thing we could do . . . we made our own!

Even though an *Ercoupe* is a spin-proof, stall-resistant airplane, there's nothing in the airplane to keep me or any other pilot from misjudging a runway or perhaps hitting a hole in a meadow that might have to serve as a landing field. With that in mind, my wife and I went to work making our own shoulder straps.

First we picked up a couple of safety belts from an old *Cub* that was being pensioned off to a scrap pile. The belting, which was in excellent condition, cost us a mere one dollar.

The next thing we did was to fasten one end of two of the belts (the buckle-half of each set) to the center ring of the *Ercoupe* seat. This ring also anchors the regular seat belts.

Following that, we drilled two holes in the back of the seat brace and, with brass bolts and washers,

By FRANK ANDREWS

fastened the other half of the shoulder harnesses. Each shoulder belt was fastened about six inches from the

outside edge of the seat so that the belt would not have a tendency to slip off the wearer's shoulder.

Within a short time, and with little labor, we had our shoulder harnesses. Just in case you think the "Sam Brown" effect of our homemade harnesses would allow the wearer's body to slide out in case of side impact, let me point out that "sliding out" would only be possible in one direction... and that would be nullified by the presence of the person sitting alongside you.

Personally, we like this "Sam Brown" effect. The harness is simple and easy to get into and can be either tightened or loosened during flight. What's more, we've found it darned comfortable to wear.

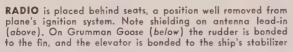
The harness may not be anchored strongly enough to withstand a 10 g pull, but after you've taken your place in the ship, fastened your harness and then tried to touch your head to any part of the instrument panel, you'll enjoy a new feeling of security.

Some flyers have told me they feel undressed without their 'chute packs . . . well, my wife and I would feel that way without our shoulder harnesses.

Fortunately for plane owners and pilots, there are a few companies that are beginning to manufacture reasonably priced shoulder harnesses. It'll be a great day when personal aircraft list those harnesses as standard equipment.

2.5







MAGNETO on this airplane is bonded to the airframe by a wire meshing. Bonding aids in dissipating static electricity

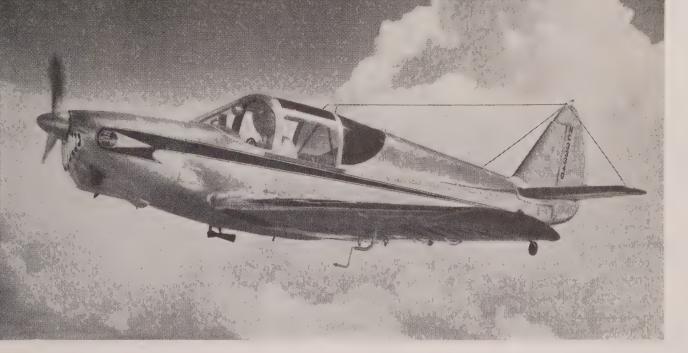




By JERRY LEICHTER

STATIC WICKS installed on trailing edge of wings and control surfaces drain off the static electricity built up on ship





ANTENNA for plane's radio is placed as far back on plane's structure as possible. One end of the antenna wire is an-

chored at top of vertical stabilizer. Antenna in this position is as far removed from ignition system as is possible

F EXPERIENCED radio servicemen occasionally reach a point where they want to beat their heads against walls in the agonies of frustration, it's because aircraft radios sometimes produce strange noises that hours of toil won't eliminate. Luckily enough, radios that refuse to give up their whines, groans and shrieks are few. Often referred to as "jinxed sets," these radios with their bad reception are victims of known conditions, but those conditions are expensive to eliminate.

Major cause of so-called "jinx sets" is installation. One manufacturer of personal-plane radios reported to this writer that investigation has proved that one-third of all his customer complaints are the direct result of installation faults, troubles in aircraft engines, or in electrical systems. The remaining two-thirds are caused by failure of set and circuit components, or cockpit trouble, *i.e.* pilot unfamiliarity with radio equipment. For the most

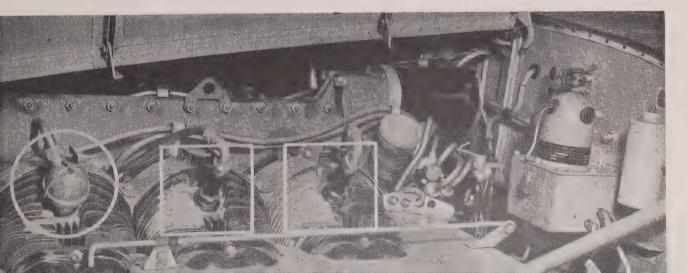
SPARK PLUG SHIELDS are available in different types. The Cup Shield (in the circle) used on this Temco Swift is made

part these complaints can be cleared up by either the replacement of certain parts in the radio set itself, or by instruction in the proper use of aircraft radio, depending on which is the primary cause of poor radio operation.

But it isn't the "two-thirds" that causes a radio repairman's hair to turn grey and get thin, it's that first "one-third": faults inherent in the installation of the radio or in the plane itself. And don't for a minute think this trouble has anything to do with price or cost of a radio . . . it hasn't. Troubles may crop up as easily in planes with expensively intricate installations as in planes equipped with a simple plug box for a portable receiver.

Let's start with the basic problem. The pilotowner has a clean airplane with a complete electrical system, including battery and generator but no radio outlets. He bases that airplane at an airport that suddenly demands (*Continued on page* 55)

by Air Associates. The other shields (in the squares) are made by BG Corp. This shielding job was done at the factory







GLOBEMASTER II, built by Douglas and designated the C-124, is the Air Force's newest troop and cargo transport. The big ship is powered by four Pratt and Whitney R-4360 engines equipped with water injection and superchargers

ports rolled off the production line at Douglas' Long Beach, California plant on Armistice Day. The Air Force has ordered 29 production models of the big ship which is presently undergoing flight

WINGSPAN of C-124 is 173 feet 3 inches, over half the length of a football field. Cargo hold is 13 feet wide, 12 feet 10 inches high





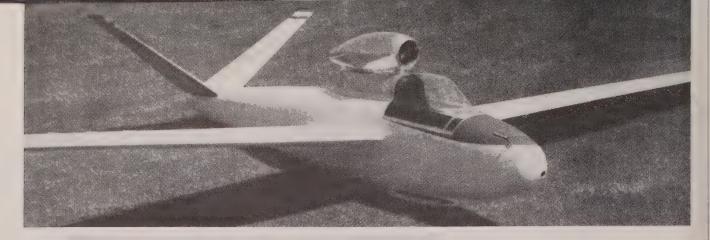
CLAMSHELL DOORS in nose provide opening 11 feet 8 inches high, 11 feet 4 inches wide. Built-in ramp permits vehicles to be driven into cargo space



tests out on the West Coast. Called the Globemaster II, the global transport has a wingspan of 173 feet 3 inches; is 127 feet 2 inches long; and 48 feet 3 inches high. While the wingspan and tail are essentially the same as its predecessor the Globemaster I (C-74), the Globemaster II has a fuselage that is considerably longer and deeper, as these photographs show. The plane is powered by four 3500-hp Pratt and Whitney engines with water injection for extra bursts of speed. The ship will carry 50,000 pounds of payload in its 10,000 cubic feet of cargo space.

GLOBEMASTER I was the Douglas C-74 combat transport. It carried 125 fully equipped troops to the C-124's 200 troops



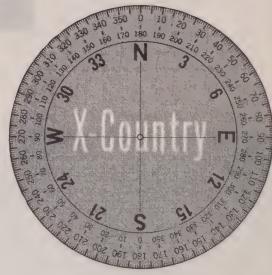




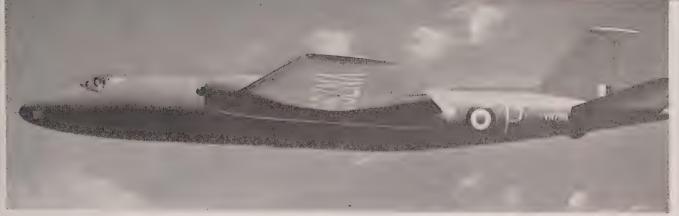
FOUGA CYCLONE is a turbojet powered lightplane that recently made its first flight. The 99-pound jet unit gives the *Cyclone* a top speed of 162 mph, a 705-fpm rate-of-climb, a service ceiling of 32,800 feet and a range of 149 miles. The plane has a gross weight of 1,067 pounds, including 165 pounds of fuel, and a wing span of 42 feet 9 inches. The jet unit is made by Szydlowski Mfg.

SAAB 29 is Sweden's single-engine transsonic jet fighter that has been under development for some time. After 12 months of accelerated flight testing, the Saab-29 is now going into quantity production. No details are available other than it is heavily armed and its performance compares to that of the U.K. jets.

CONVAIR C-99 is here shown in its "proposed" state (below). This design proposal has been submitted to the Air Force, and is in the main a transport version of the B-36 bomber. The fuselage is larger, however, to permit hauling of 100,000 pound payload over long range. It will have a wingspan of 230 feet.







CANBERRA, designed and built by English Electric Company, is high-altitude medium bomber powered by two Rolls Royce *Avon* turbojet engines of 7,500 pounds thrust each. Plane is reported to have sensational climb and substantial range.

PIASECKI HRP-2 is Navy's new all-metal fuselage tandem-rotored helicopter. Feature of HRP-2 is its side-by-side pilot seating and complete dual controls. The Navy specifications call for eight passenger seats, more can be carried on short hauls.

SIKORSKY HO3S-1 helicopter now can be equipped with utility flotation gear which permits intentional rescue landings on swamps, muskeg, snow or ice. Four inflatable bags or "doughnuts" are blown up by carbon dioxide from Kidde unit.

VOUGHT XF6U-1 is being used by Navy to test new type of fuselage dive brakes. These dive brakes open at right angle from the fuselage and are installed aft of trailing edge of the Chance-Vought XF6U's wing.







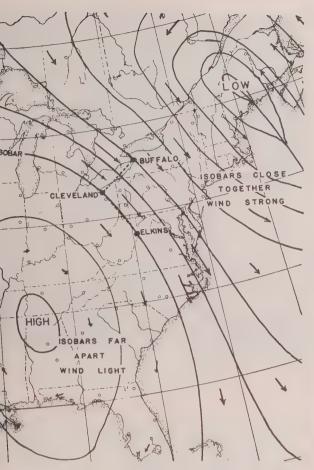
WEATHER BUREAU technician charts path of small balloons on a "winds aloft" chart. Path of the balloons reveals the

direction and the speed of the winds aloft. Navigating with winds-aloft reports requires computer and some plotting

Use Your Altimeter Setting

PRESSURE DIFFERENCE flying gives the pilot a far quicker and more easily obtainable drift correction angle (DCA)





WEATHER MAP shows how winds parallel isobars. Arrows indicate the direction of the wind and relative velocity



mitter. 'Chute helps prevent breakage of the transmitter

Here's an easy lesson in using altimeter setting as a basis for navigation

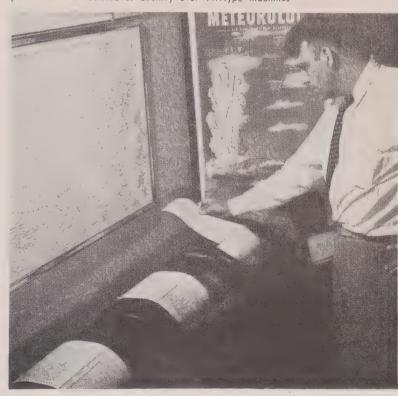
By BOB MUDGE

DELIEVE it or not the altimeter setting which you may have been using for years is good for something besides setting your altimeter! It can actually form the basis for your whole navigation system. With it, you can forget the winds aloft reports and most likely be the better off for it. You can, at least, if you normally fly an altitude below 5,000 feet, and fly in areas where altimeter settings are readily available.

Navigation is an ancient and honorable art—but once in awhile we get a new angle to an old problem. That's what we have here. We'd like to show you how you can get your drift correction angle (DCA) from the altimeter settings which are issued hourly over the CAA teletype systems and are available on request by telephone or radio from any CAA broadcast station.

In the technical world we live in, new methods

FORECASTING UNIT of Weather Bureau gets weather reports from all sections of country over Teletype machines





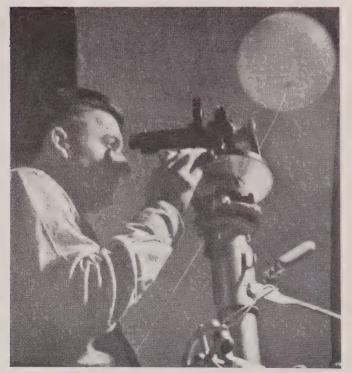
COMPUTER is set for problem discussed. Using computer, the pilot finds that at his airspeed (120) the DCA is 8°



PROFILE of weather between points is prepared by technician to aid pilots in planning best altitude of flight

are often more complicated than the method being replaced. With pressure-difference flying, however, just the opposite is true. It gives us a quicker and more easily obtainable drift correction angle. Even beginners who don't go in for extensive navigation will find a lot to be gained from a knowledge of pressure-difference flying. We'll discuss this in more

TECHNICIAN follows direction of balloon via a theodolite. Its path reveals winds aloft info included in pibals



detail later. First, let's take up the theory involved.

Look at the weather map shown on page 33.

Essentially this is a replica of an actual map. However, to make it simpler to read most of the information contained on a regular weather map has been eliminated. We have included the isobars and

arrows, however, which indicate wind direction and relative velocity.

The first thing you will notice is that the wind does *not* blow willy-nilly. It has definite traffic rules of its own. At the moment we need concern ourselves with only three of these:

- 1. The wind always parallels the isobars.
- 2. Its strength varies inversely with the distance between the isobars.
- 3. In the northern hemisphere, the wind always follows the isobars so as to move clockwise about a high-pressure area and counter-clockwise about a low-pressure area.

Pick out Cleveland and Elkins. Note that they lie on the same isobar. This means that their pressures are the same. If their pressures are the same, their altimeter setting will likewise be the same. If we were to fly from Cleveland to Elkins, we would have a direct tailwind (since lower pressure is on our left) and, therefore, no drift correction to make. Thus, in flying between points with the same altimeter setting, no drift correction is required!

Now suppose we were to fly from Cleveland to Buffalo. Here our course lies directly across the isobars—directly crosswind. We are flying toward a lower pressure. The wind will, therefore, be from our left and we will have (Continued on page 52)



PILOT Andy Witmer knows from experience the rough ride flying the soup can produce for the novice on the gages

RIY IRR If... By ANDY WITHER

Several months ago SKYWAYS featured an article on instrument flying. I guess you might call this a P.S. to that piece, sort of an extra word of caution to the pilot with a lot of VFR hours, instruments on his panel, Link training, but not much real experience in the soup.

Fighting a needle, ball and airspeed is o.k. under the hood. Pilots with CAA instrument ratings had to do it for their flight checks, and had to do a good job of it, too. Under actual instrument conditions, however, a psychological phase sets in; the pilot bears a load of nervous tension and anxiety that no Link time ever produced. With the world closed in around you, you have to fly right . . . no mistakes are forgiven.

What too often happens is that a novice needleand-ball guy gets into some rough air in the soup. The needle begins to bounce from peg to peg. Panic sets in, followed by vertigo . . . and somebody makes the headlines the next day, headlines

Do's and Don't's for the pilot with instruments but not much soup time

he never gets to read. Even if a cool, highly experienced pilot can keep his head and average the needle out, he'll probably admit he's gone through a nerve-wracking experience and it "weren't worth it" in the first place.

This reporter is an ex-USAF pilot with time in B-25's in the Aleutians, and P-40's and '51's here in the States. I've been under instrument conditions in all those ships, but I was fortified. . . . I had a panel of gyro instruments. In the past year and a half I've been making a living as a staff pilot, flying a Beechcraft Bonanza, logging over 1,000 hours in that swell little plane. In that time, I've made 30 actual instrument let-downs (standard range approaches), but again . . . I was fortified with a full panel. My ship also has two-way VHF, plus a Motorola range receiver and 3105 transmitter.

Instrument flight in small planes is safe to a certain extent and under certain conditions. And when I say "small plane," I mean single-engine stuff. My instrument time has filled me with some very firm opinions. If you fly instruments, you've probably got a lot of opinions, too. Anyway . . . here are mine:

- 1. Never venture into instrument conditions or file an IFR if your plane isn't equipped with gyro instruments.
 - 2. Keep in instrument (Continued on page 47)



It. The Civil Aeronautics Administration is allout now on a program to bring man's most primitive enterprise, agriculture, to his most modern business, airports. And, from Georgia to California, dozens of airports are able to remain open thanks to the things that sprout out of the ground as well as that land upon it. A number of airports are actually drawing more revenue from crops than from aeronautical activities.

Forty-two airports in six Southeastern states—Alabama, Florida, Georgia, Mississippi, North Carolina and South Carolina—realized \$33,800 from crop-growing activities in a year's time.

At Herington, Kansas—the town has a population of 5,000—the airport grossed \$100,000 from a year's hay and seed harvest.

The crop-earning figure of most airports will be considerably less than that—usually ranging from \$2,000 or \$3,000 to \$8,000 or \$9,000—but that amount—be it from melons or alfalfa—ain't hay. In fact, it's frequently the margin that enables the airport to stay in business.

In interesting a town or municipality to take over a surplus military airfield, the CAA now says: "The field will enable you to take care of more planes and to broaden your aeronautical scope—and, just think, you can grow a wonderful crop of squash out there in left field."

As a matter of fact, the CAA has in its employ a man—one Andy Chambers, by name—who is an expert on airport-growing crops. If an airport indicates interest in developing a crop production, the CAA will send Andy (Continued on page 58)

AIRPORT OPERATORS are making extra money which enables them to keep airports open by growing certain crops on unused land. One operator planted pinto beans in between field's runways and netted himself an extra \$5,000





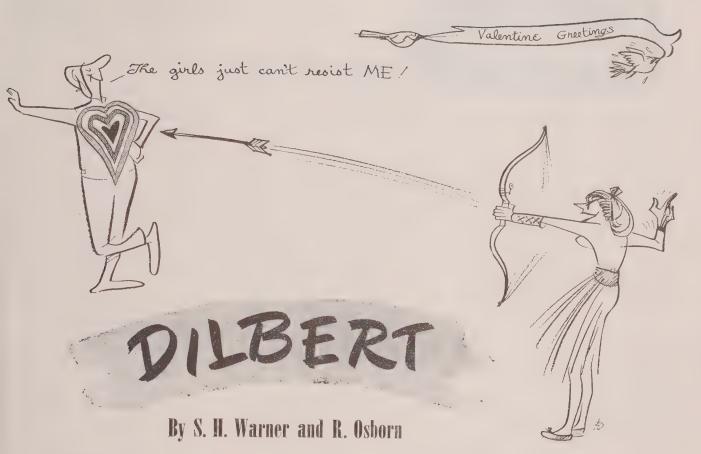
RUNWAYS on this field remain open while rest of the airport is given over to a crop that brought operator \$8,000

CROPS such as hay, barley, alfalfa, even melons or squash can bring the airport operator enough extra money to

not only permit him to stay open all year 'round but to improve the airport's existing facilities for private pilots







Icecapade—Here's one that even the witnesses said they wouldn't have believed unless they'd seen it themselves. I got it direct.

It happened in Alaska. Because of terrain difficulties, the pilot of a twin-engine cargo job elected to land downwind. The runway was very slippery due to a half inch of snow over a layer of ice. There was a 12-mile wind.



The approach was high and a bit fast; touchdown was not made until almost midfield. Brakes were of practically no use. Noting that he was rapidly running out of runway, the pilot attempted to groundloop by applying full throttle to one engine. It worked beyond his wildest hopes!

The plane slithered around 180° while remaining in the middle of the runway. It continued down the runway tail first. The pilot applied full power on both engines, using the thrust as a brake, and came to a stop on the turn-around area at the end of the

runway. From this point he taxied to the hangar and casually tipped his cap to the bug-eyed witnesses.

Instrument Flight Not Blind—Unfortunately, someone used the term "blind flying" to describe the first flights on instruments. Unfortunate because this descriptive misnomer has stuck in the minds of the non-flying public and, worse yet, still sticks in the minds of some pilots. Get it straight once and for all, instrument flying is not "blind flying," but trying to stay VFR in instrument weather is.

It is natural to prefer to fly VFR whenever possible because of the convenience of less briefing, no delays in clearing, and ease of navigation. This is no excuse, however, for the dogged determination of some pilots to remain contact in marginal and bad weather. Of course, this refers only to qualified instrument pilots—others have no business being in the air, at least none for (Continued on page 63)



Operational Engineering

Windshields Call For Care

OST of the plastic windshields, canopies and windows used in U.S. aircraft today are made from either of two trademarked methyl methacrylate resins; Plexiglas, manufactured by Rohm & Haas Company, Philadelphia, or Lucite, manufactured by E. I. du Pont de Nemours & Co., Inc. Both are thermoplastics and will soften when heated, usually being formed at temperatures just above the boiling point of water.

Chemically similar, these acrylic resins have a surface hardness comparable to that of copper, brass or aluminum and, whether in sheets, tubes or in already formed variations, require careful treatment in storing, handling, cleaning and repair in order to remain crystal-clear and unblemished. Whether formed of Lucite or Plexiglas, transparent aircraft enclosures require expert care by mechanics and pilots to avoid breakage. SHOP STORAGE

These plastics should be kept in a cool, dry location away from radiators, heating coils, hot water and steam pipes. They should also be kept out of paint spray or paint storage areas since solvent fumes may affect the surfaces. When masked with paper, the plastic sheets or forms should be kept away from direct sunlight since the rays may deteriorate the adhesive of the masking paper, making it difficult to remove. Formed units should be stored either in original cases or in

special racks, taking care there is no pressure or strain on the plastic.

When removing the masking paper, pick up a corner and roll it easily in the form of a tube, pulling it away from the plastic. If any of the adhesive sticks to the plastic, it may be removed by rubbing gently with the fingers in much the same way as rubber cement is removed from paper. If the masking paper does not come up easily, Rohm & Haas suggest using kerosene or hexane to moisten the paper used on Plexiglas, while du Pont suggests using the so-called Proprietory Solvent formula, marketed under various names, for removing paper from Lucite.

SAWING AND DRILLING

Either plastic may be cut easily with an ordinary band, circular or jig saw. Water or soap and water are the preferred cooling lubricants if the use of a coolant is necessary. The plastic may be filed with ordinary wood or metal drills except in certain special operations. Moderate rather than high drill speeds, light pressure and frequent cleaning away of shavings from the hole give the best results. CLEANING AND POLISHING

Both Plexiglas and Lucite are cleaned in the same manner and require the same cautions. Never use gasoline, turpentine, alcohol, benzene, acetone, toluene, carbon tetrachloride, fire extinguisher or de-icing fluids, lacquer thinners or glass window cleaning sprays for cleaning or removing dirt deposits from Plexiglas or Lucite. These cleaning agents will soften and may craze the plastic. Also, never use any type of kitchen cleanser. Such cleansers will pit and scratch both Plexiglas and Lucite.

Remove oil or grease from your plane's windshield or windows by rubbing the plastic lightly with a cloth wet with kerosene, hexane or naphtha. Never wipe when dry as slight coatings of dust or salt-spray deposits may scratch the surface. Use plenty of mild soap and water applied with the bare hand or a soft cloth, chamois or cellulose sponge. Rinse with clean water and then dry with a clean damp cloth or chamois. Rubbing with a dry cloth will set up electrostatic charges that will immediately attract dust particles; the damp cloth will eliminate this condition.

After cleaning, the entire surface should be waxed with an anti-static or water emulsion wax, both to fill in minor scratches and to give the surface a protective coating. The wax should be applied in a thin even coat and polished with soft cotton flannel or jersey, taking care not to apply too much pressure or rub too long in one spot. BUFFING AND SANDING.

These operations to remove scratches or defects too deep to be eliminated with hand polishing should be done according to directions contained in the Plexiglas and Lucite manuals, available from the manufacturers. (Write Du Pont at Arlington, Va. for the Lucite manual; write Rohm & Haas in Philadelphia for the Plexiglas manual). Buffing should be done with wheels made up of very soft cotton materials. Hand sanding, with a rubber or felt base block requires sand paper no coarser than grade 320 and for successive sanding operations to remove scratches left by previous paper, progressively finer grades should be used: 360A, 400A, and 500 or 600A. When removing scratches, always wetsand an area two or three times greater than that affected by the defect to prevent local op-



BEECHCRAFT BONANZA, all-metal four-place monoplane, features an E. I. du Pont de Nemours Co. Lucite windshield and cabin windows

cal distortion, using a circular hand motion. EMENTING.

Both Rohm & Haas and Du Pont recomend different methods and types of solvents r cementing their respective plastic prodets, and this type of operation should not e attempted without referring to the manals and following specific directions for prearing, heating and joining the materials. lexiglas requires Cement 1-A or 1-C, used either "soak cementing" or "glue cementg," but differing according to the strength ad speed required. Lucite requires either a olvent type (100 per cent glacial acetic acid Du Pont H-94 Cement) or a monomer pe (Du Pont H-78 Cement), the latter for nop operations. While Plexiglas joints to be emented may be polished, sanded or manined smooth before joining, Du Pont reorts Lucite should be machined as the polshed joint has a tendency to craze when ement is applied.

Either plastic may be "glue cemented" in omewhat the same manner, using a "glue" nade from dissolved chips of the plastic.

MERGENCY REPAIRS.

Plastic aircraft enclosures occasionally deelop stress cracks near panel mounts due o pressure or mount tension from uneven xpansion. A small hole (1/8 or 3/16-inch in iameter) drilled at the extreme limit of the rack will usually relieve the stress and preent the crack from lengthening until relacement or repair can be made.

Long cracks have to be reinforced to preent a panel from splitting completely across. Drill small holes at intervals of about one nech along each side of the crack, at least ne-half inch away from the edge of the rack, and then lace soft wire through the oles. This may be further reinforced temorarily by applying a fabric patch over the need area, using rubber cement as the adesive.

Occasionally, holes in plastic surfaces may e temporarily patched by cementing a piece

of beveled plastic over the area, using sufficient over-lap to insure a good bond. PERMANENT REPAIRS.

Damaged areas may be cut out, if not too large, and repaired with a cemented plug of the same type of plastic as the section being repaired. Plug patches make it necessary for the hole to be trimmed to a circle or oval shape and tapered. The patch, cut from a section of plastic slightly thicker than the material to be repaired, is then heated and inserted in the hole without cement, seated firmly and allowed to cool, then removed and treated with cement to soften the edges and then replaced and held with firm pressure until set. It is important that the plug be tapered at a sharper angle than the edges of the receiving opening. After 24 hours, bond is usually firm enough to allow sanding, buffing and polish to smooth the joint and even the surface.

RECOMMENDED MATERIAL.

Hand cleaners recommended for polishing Lucite or Plexiglas include: Parko Gloss Polish & Cleaner No. 4B-L; Wilco Scratch Removing Compound No. 55; Franklin's Plexiglas Cleaner; Triple Life Cleaner & Glaze; Turco L-567 Cleaner; O-Cedar of Canada M-37 Plastic Cleaner; Noxon Cleaner Polish; Ken-Glo; Puritan's Plastic-Kleen; Autogroom Cleaner; Lincoln M-3828 Liquid Cleaner; McAleer PLEXI-I-GLO Cleaner & Polish and Simoniz Liquid Kleener.

Recommended waxes for hand finishing plastic surfaces include: Permaseal, Franklin's Plexiglas Wax, Triple Life Wax & Paint Protector, 3M Auto Wax, Simoniz Wax, Parko Eze-Wax, Johnson's Industrial Wax No. 102-C, Duco No. 7 Automobile Wax and Marvedel Polishing Wax.

Recommended sandpapers in the grades listed in the sanding section are manufactured by Minnesota Mining & Mfg. Co.

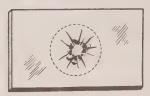
The condition of your windshield is important to safety. Handle those plastics with care and consideration. Jerry Leichter



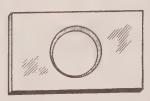
ERONCA CHAMPION, two-place trainer, features plexiglas (Rohm & Haas) windshield

PERMANENT REPAIR

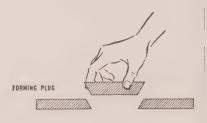
CUT OUT RADIAL CRACKS



TAPER EDGES



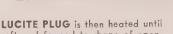
REPAIR of Lucite calls for cutting away fractured sections by making circular cut around area larger than fracture. Then edges are tapered by filing or sanding: a plug of Lucite is cut and tapered to fit hole



CEMENTING PLUG

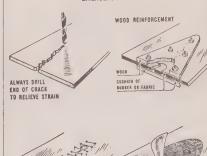


SANDED AND POLISHED



soft and formed to shape of opening by pressing into place. After cooling, plug is removed, edges softened by soaking in cement, replaced, held in place until set

EMERGENCY REPAIRS





EMERGENCY repairs may be done in one of several ways. Favorite seems to be to drill series of small holes alongside crack. Then lace soft wire through the holes (bottom left). Repairs like this are makeshift

C.A.P. News from Hq.

8th Anniversary

The Civil Air Patrol celebrated its 8th anniversary on December 1 with Wing and Squadron doings in all sections of the U.S. A coast-to-coast radio program, beamed from California, detailed the achievements of the CAP as part of the nation-wide celebration.

Officers Candidate School

Boston, Mass. A group of senior members assigned to flights of the 3rd Group, Massachusetts Wing, recently completed a course at Officers Training School. Officers Candidate school will soon be started to train new members recruited through radio and television. Members between the ages of 18 and 21 will receive training which will make them eligible for commissions.

New Wing Activated

Washington, D. C. Major General Lucas V. Beau, Nat'l Cmdr of CAP, accompanied by Lt. Col. J. B. Pattison, Major R. A. Tennert, Major F. C. Bishop, and Capt. R. E. Tilton, recently returned from San Juan, Puerto Rico, where the 52nd Wing of the Civil Air Patrol was formally activated. Squadrons at San Juan and other cities will include Air Rescue and Communications units.

Search Mission

Detroit, Mich. The Civil Air Patrol along with the Coast Guard and Air Force Air

Sea Rescue units recently were called upon to search for three Detroiters, reported missing in a 12-foot rowboat off the eastern Michigan coast of Lake Huron. Ten CAP planes were out on search within three hours of receipt of the first request. Unfortunately, all three of the missing Detroiters are believed to have perished. The CAP recovered the body of one of them the day after the search was set up.

Maryland Gets Three Planes

Baltimore, Md. Flying strength of the Maryland Wing has been increased by three airplanes, the State patrol headquarters has announced. Two of the L-4's were shipped in sections from Pyote Air Force Base, Texas, while the third was flown from Roddey Airport, Rock Hill, S. C. One of the new planes has been assigned to the Hagerstown squadron, and one to the Patterson squadron in Baltimore. The third has not yet been assigned.

Wyoming Search

Cody, Wyoming. A full-scale search for the Rev. Claude Keck ended successfully when he was found unharmed after a three-day search. The missing man was spotted by the ground crews of the Lovell and Greybull Squadrons of the Civil Air Patrol, working in conjunction with State highway patrolmen, Sheriff's officers and rangers who combe the area for three days after the Rev. Kec was last reported seen with a hunting part in the Big Horn mountains along Porcupin

Montana Wing

Cut Bank, Mont. The Montana Wing of th CAP now has four L-type aircraft on loa from the USAF. At the present only thre of the ships are flying; the other one is i for maintenance.

Gets Commercial License

Clarksburg, W. Va. Mrs. Roy Nesbitt, PI of the Buckhannon Flight of the Wes Virginia Civil Air Patrol, has won her con mercial pilot's certificate. Reported to be th first woman in West Virginia to have bee granted a commercial ticket, Mrs. Nesbit began her flying in 1946 with United Aer Activities at Benedum Airport, Clarksburg

New York Mission

Honeoye Falls, N. Y. After a three-day searc in which CAP walkie-talkies, L-4 aircraft an mobile and fixed radio stations were in re peated action, the Honeoye Falls Squadro of the CAP succeeded in locating the bodie of Leo S. Marcott, 40, Rochester, N.) fisherman and his son, John, 6, in the lake i which they were drowned. The bodies wer spotted by two CAP flyers from their airplan as they scouted the area in which the car sized boat had been found. During the fligh constant contact was maintained with CA radio ground units. The CAP men wh located the bodies were Sgts. Burr Scott an Wilson Magin.

For Services Rendered

Barre, Vt. Nat'l Cmdr Major General L. Y Beau presented the Air Medal to Lieut. D. Farrelly for his participation in over-water sub patrol flights during World War I Presentation was made at Barre, Vermon

AIR MEDAL was presented to Lt. Farrell by Nat'l CAP Cmdr. Maj. Gen. L. V. Bea

ARIZONA WING, Tucson Squadron, celebrated 8th Anniversary of CAP at a dinner at the Tucson Press Club. Maj. Griffith, Col. Selser, and Lt. Birdman cut Anniversary cake





Combat 8 Miles Up

(Continued from page 15)

has advanced considerably during the four years since the end of the war.

Although one of our top-flight high-speed bombers, the Boeing B-47, is called the Stratojet, this is not to be regarded as reflecting the strict scientific facts of the case, but more as the continuation of a company policy emphasizing the high-altitude performance of many of its recent products (cf. the prewar Stratoliner, the world's first pressurized commercial airliner; and the postwar Stratocruiser and C-97A Stratofreighter). Actually, except for a few experimental models, airplanes so far can only operate in the troposphere. This is a belt below the stratosphere, and it varies in thickness from about 27,000 feet at the poles to about 50,000 feet at the equator. It is that part of the atmosphere which is warmed by heat from the earth-heat originally received from the sun-hence it is the region of weather.

About seven miles up (36,090 feet) occurs the phenomenon known as the *tropopause*—the official commencement level of theoretical constant temperature (—67°F), stabilizing a definite pressure and density relationship. This has been the lower limit of practically all Air Force and Navy "climatic" testing of equipment, at Eglin Air Force Base for example. High-altitude test flights in the B-36, however, have run into temperatures as low as —95°F, and further tests are now under way to meet this new condition. This naturally involves such items as hydraulic equipment, bomb-bay door actuators, electric motors, servo mechanisms, etc.

For jet engines, the critical feature is the turbine temperature. As height increases and less air enters the compressor, the jet-pipe temperature goes up for a given speed, and the fuel supply must be progressively reduced to maintain a suitable mixture ratio. Combustion efficiency becomes more and more difficult to achieve, as the jets tend to "flame out" at the reduced throttle settings. Once out, to re-start (or "light up" again) becomes next to impossible. Current turbojet units lose more than 75 per cent of their thrust at 40,000 feet.

In the constant see-saw of offense vs. defense which has been going on for many a century, it is now generally conceded by all but a few diehards that the high-flying bomber at the moment has a very slight advantage over the attacking fighter. This balance, however, could easily be upset by the development of true interceptors with more powerful jet engines, rocket-assisted or equipped with after-burners; straight rocketpowered interceptors; accurate ground-to-air guided missiles equipped with proximity fuzes; and air-to-air guided missiles to be fired from attacking fighters and which would outrange the remote-controlled cannon of the bombers. More on that later.

The present advantage of the bomber may be summed up in the jet fighter's sluggishness at extreme altitudes which gives the bomber a definite edge in maneuverability, and the greater range of the bomber's electropically fixed heavy guns

tronically-fixed heavy guns.

The really critical factor is maneuverability. At 40,000 feet the maneuverability of most currently operational jet fighters is limited to wide sweeping turns of several



AIR FORCE'S B-36, favored high-speed, long-range bomber, is now equipped with four J-47's in pods to add to plane's speed. Jet interceptor development may make B-36-types obsolete

miles radius. A fighter cannot climb beyond its altitude barrier any more than it can exceed its critical Mach number. At high altitudes Mach 1.00 (the speed of sound) is reached at 662 mph, rather than the 762 mph at sea level. Every modern combat plane has a "Mach meter" with a red line, representing a speed beyond which it cannot go without encountering compressibility effects. This speed limit can only be pushed upward by designing for supersonic speeds, including sweptback wings, as in the F-86.

The other factor affecting altitude maneuverability is wing loading. Today's high wing loadings mean high stalling speed. Here's what happens. Early-warning radar picks up a big bomber. You are a jet fighter pilot, and you get upstairs to 40,000 feet in from 10 to 12 minutes and have him spotted. In a head-on attack you are traveling at 450 mph and he is doing 300—this is a closing speed of 750 mph, or better than 12 miles a minute. You may have one to two seconds to get in your burst.

Or if you decide to tackle him on the basis of the fighter pilot's mathematically worked out "pursuit curve" (these are now being reworked for the new speeds and other conditions) you approach at an angle and turn in at the right moment. This turn means slowing down, and that's just what you can't do with a jet. Your engine doesn't suck in enough of the thin air at 40,000 feet, and you stall out.

Maybe you try the bomber from behind and your higher speed allows you to overtake him for the kill. (You hope his tail guns aren't working.) Just as you get within range the bomber pilot swerves off to the left. You have to keep going and make a wide turn, or you'll stall; by the time you have come around, your bomber is well on its way—out of range.

The important thing to remember in this, however, is that it is the picture as it stands today. Tomorrow is quite a different thing. Much is being done to meet this bombattack problem, and there's many a bomber pilot who'll admit a preference for sitting in a fighter rather than a bomber when D day at 40,000 feet arrives.

Some of the newest interceptors do show an improvement in this bomber-attack-athigh-altitude picture. Actually the U. S. air services have never developed a true interceptor type. The Air Force strategy has been to keep warfare out of America's skies. This has meant long-range bombers and more or less all-purpose fighters, but not interceptors. Reading Army "Air Corps" literature of the period just before the World War II will indicate that the Lockheed P-38 Lightning was developed as a somewhat unorthodox interceptor, with two turbo-supercharged engines for fast climb and high-altitude performance. It came to be one of the most versatile aircraft of the war (only the British Mosquito had a larger number of tactical roles), but it saw very little action as an interceptor, such as did the Spitfire, Focke-Wulf 190 and the Jap Zero.

In today's jet age, however, both Air Force and Air Navy have several true interceptor models well on the way. These include the Air Force's Republic XF-91 jet-androcket powered interceptor, which gets to 60,000 feet in a little over nothing flat, and the needle-like Lockheed F-90 which boasts exceptional long-range performance; the Air Navy's McDonnell F2H Banshee, which can get to 50,000 feet in less than 15 minutes and travel at 500 mph when it gets there; the Navy's Chance Vought XF7U-1 Cutlass, tailless, sweptwing fighter, designed to do better than 600 mph at 50,000 feet. McDonnell's F-88 Voodoo, now in production for the Air Force, although designed as a highspeed, long-range penetration fighter. has proved in tests to have excellent characteristics as a high-altitude fighter. The F-86 is also a good "up-stairs" performer, and the XF-93, with J-42 Turbo-Wasp engine (due

The British interceptor picture is also improving. The newest Vampire development, the D.H. 112 with the Ghost jet engine, has been named Venom, and its high-altitude performance is noteworthy. Its prototype was the altitude-record holding Ghost-Vampire which has climbed to 50,000 feet in 13 minutes on several occasions, retaining good speed and maneuverability at this level. Even this excellent performance has been eclipsed by the Avon-Meteor, an experimental Meteor with the new 7,000-pound thrust Avon axial-flow turbojet, which can climb to 40,000 feet in between four and five minutes.

to fly early 1950), will be better yet.

One reason for their rapid rate of climb is the lower wing loadings of British fighters, which average about 45 pounds, as against an average of 55 pounds for the U.S. Air Force's F-80, F-84 and F-86. The German figure was in between, averaging around 50

(Continued on page 45)

CAOA REPORT..



CORPORATION AIRCRAFT OWNERS ASSOCIATION.-INC.

Corporation Aircraft Owners Association is a non-profit organization designed to promote the aviation interests of the member firms, to protect those interests from discriminating legislation by Federal, State or Municipal agencies, to enable corporation aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. The CAOA headquarters are located at 444 Madison Avenue, New York 22, N. Y.

Crash Hearing

As a result of the CAB hearings on the tragic EAL—P-38 crash at Washington National Airport, the CAA began moving in various parts of the country to prohibit military aircraft from using high-density air terminals. The original prohibition (NOTAM of November 16) included "combat-type" military aircraft converted to civil use.

Insomuch as this affected several member companies of CAOA operating executive aircraft converted from A-26's, B-23's, B-25's and PV-1's, a protest was immediately lodged by CAOA with the Air Traffic Control Division of CAA.

A second clarifying NOTAM was issued on November 18 which restricted the prohibition to military or civil "fighter-type" aircraft.

The Port of N.Y. Authority made a similar move as regards New York International, La Guardia and Teterboro; Newark is not affected now owing to a long term lease with the Air National Guard.

According to reliable information from Washington and other CAA regions, it was CAOA's prompt action, as the "organized voice of executive flying," in filing CAOA Chairman Belden's original protest to the closing of Washington National to all but scheduled airliners, that was the decisive factor in setting up the present policy.

ANG at Commercial Fields

Company pilot L. D. Kirby of Universal Moulded Products Corp., Philadelphia, reports a dangerous situation in the use of Philadelphia International Airport (S/E) by the Pennsylvania Air National Guard.

Mr. Kirby further points out that Northeast Airport, situated several miles away, is an excellent field for military operations and was used as such during the war.

Specific action by CAOA in this matter is already underway.

CAOA director Cole H. Morrow, chief plant engineer and official in charge of J.I. Case Company executive aircraft operations, tells of several narrow escapes with Air National Guard jet fighters on commercial fields located in the Middle West.

The American Association of Airport Ex-

ecutives has appointed a subcommittee headed by Melvin Nuss of Reading Airport (Pa.) to find out the aviation industry's opinion on the important question of separating military operations from commercial airports.

The Corporation Aircraft Owners Association has expressed itself definitely in favor of such a separation, and working for it.

Cessna Developments

According to a last count, there are well over 300 Cessna 190's and 195's owned and operated today as executive aircraft. Most of these planes are professionally piloted.

Through the always active aviation grapevine system, we understand that not too many more of the 195's will be built, owing to the fact that its powerplant, the Jacobs R755 radial, aircooled engine of 300-hp for takeoff, is running out at War Surplus.

It is also rumored that the radial engine of the present Cessna 190 (Continental W670, 240-hp for take-off, 220 hp normal) will be replaced by a new Continental flat-six engine rated at 240 hp. This new Continental, said to be patterned on the E-185 that powers the Navion and Bonanza (now rated at 205 hp), reportedly has been run several hundred hours on the block at better than 300 hp.

The Cessna change from radial to horizontally-opposed flat-six in the Cessna 190 will mean both better visibility and less expensive and easier maintenance.

Business Flying Up

Based on a sample survey conducted by the Aviation Statistics Division of the CAA, it was found that flying by business men and farmers accounted for 17 per cent of the total hours flown by private and non-scheduled commercial aircraft during 1948. This compares with 12 per cent in 1947.

The substantial increase in business flying

was considered the most encouraging aspect of the 1948 private-flying picture. Business flying, which includes not only flying for corporate or executive purposes, but flying by individuals, including farmers on personal business, totaled 2,576,000 hours, compared with 1,966,000 hours in 1947.

In response to a question, the CAA ventured an informed guess that roughly 50 per cent of the total hours represented company flying. This means approximately one and a quarter million hours flown by corporation and executive planes during 1948. At an average cruising speed of 160 mph this represents 200 million miles of flying.

CAOA Directory

Some 2500 copies of the new CAOA Directory have been distributed by CAA to control towers in all parts of the country. One result will be better attention and service from both control towers and service operators.

The CAOA membership for 1949 indicates a 150 per cent increase over last year's membership. About 35 per cent of the member companies are located in the northeastern section of the country; another 33 per cent are in the Middle West, 10 percent in the South and 12 per cent in the Southwest and 12 per cent on the West Coast.

The goal by spring is another 100 per cent increase in membership . . . and this figure is already well on the way to reality.

Piper Readies Brigadier

Some months ago the Baumann Brigadier was introduced to CAOA. Today that ship has been purchased by Piper Aircraft Co., and plans and developments are underway for Piper to produce the small twin-engine executive ship. Piper's version of the Brigadier will be powered by two 190-hp Lycoming engines in tractor position rather than pusher as with the original Brigadier.

Twin Bonanza

The Beech *Twin-Bonanza* is undergoing flight tests and it is expected to go into production shortly. Price tag is \$30,000.

New Navion

Unlike other companies, Ryan Aeronautical is not going into the twin-engine field. Instead Ryan is producing a *Navion* powered by 260-hp Lycoming. Called the Super 260, it will sell for less than \$14,000, equipped.

EXECUTIVE CESSNA powered by 300-hp Jacobs engine may soon take new Continental engine. According to rumor, there are not many 300-hp Jacobs engines left in War Surplus



Combat 8 Miles Up

(Continued from page 43)

ounds, and that of the Russians is believed be somewhere in that vicinity.

At the Soviet Aviation Day show at the ushino airdrome (near Moscow) last July t least three 600-mph jet fighters were seen some quantity. They were the twin-jet A-8 (designed by Lavochkin), the twin-jet IIG-7 (designed by Mikoyan and Gureich), and the YAK-15 (earliest of the aree, designed by Yakovlev). That they ave speed and maneuverability at low altiide is unquestioned, but their high-altitude erformance, if known to our Intelligence, not releasable.

A few things are known, however. The oviets have shown a great interest in the MW-003R version of the standard axialow turbojet used by the Germans toward he end of the war; this had a built-in rocket nit which gave aircraft using it a climb to 0,000 feet in two minutes, the jet engine roper then carrying it to 40,000 in a few inutes more.

The Russians also have an improved verion of the ME-263 rocket-powered intercepor, which missed the war by a few months. 'he earlier ME-163, powered by a Walther ocket unit, got into limited action in the utumn of 1944. The 263 has a very limited ndurance, but it does get to 50,000 feet ery rapidly. Even a few of them could make t very uncomfortable for high-altitude heavy ombers of the reciprocating-engine type.

With all this interceptor stuff fully operational, say within the next couple of years, it appears that the piston-engine bomber will have a tough time of it by then. The B-50, even with better compound engine hook-ups than the now abandoned Wasp Major-VDT, and the jet-assisted B-36, will hardly top a fast cruising speed of 400 mph at 40,000 feet. The next mark to shoot at will undoubtedly be 500 mph at 50,000 feet. and this should be within the development possibilities of the production B-47 with six GE J-47 jets, and the jet-powered Northrop Flying Wing-both, however, in the 2,000mile radius of action (medium range) cate-

This brings up the question of armament vs. speed as defense for the bomber at high altitude. Prewar Air Force doctrine was that the high-flying B-17 (25,000 to 27,000 feet) would be fast enough and rugged enough to operate without much of any defensive armament. By mid-1942, however, the B-17E bristled with power-operated turrets and hand-operated .50-cal. machine guns on all quarters.

However, even this was not enough. The Schweinfurt mission of October 1943, while effective in its bombing results, was almost disastrous combat-wise. Moreover, it was simply the climax of a week which saw four maximum-effort missions fly hundreds of miles deep into enemy territory. Nearly 150 B-17's and combat crews were lost, and 300 more bombers heavily damaged. Much of the damage came from airborne rocket missiles fired from ranges of 1,000 to 1,500 yards,

beyond the reach of the B-17's guns. The need for fighter escort all the way to target and back was conclusively demonstrated. and was provided before the big air battles of February 1944. Technically, defense had more than caught up with offense.

For the type of missions required by another war, fighter escort will, in most cases, be out of the question. One important reason is the human limit of pilot fatigue. During the war in the Pacific the 1500-mile round trip seven-hour P-51 missions from Iwo Jima to Tokyo, flown by Seventh Air Force pilots, both in escort of B-29's picked up en route and independent fighter actions, were extremely hard on the pilots. Even worse were the 1800-mile nine-hour P-38 missions flown by Thirteenth Air Force pilots from Morotai to Balikpapan. With jet fighters cruising at 500 mph, this time would be cut in half. but under the geographical conditions of another war the distances may well be doubled or more. You just can't win . . . or, perhaps, aircraft carriers would be the answer here. There are many in the top circles who believe this . . . and believe it without bias.

So it seems to be speed, plus altitude, clouds and darkness, or armament, but no escort fighters if, that is, we abandoned the carrier idea. The B-36 will be protected by an improved electronic central-fire control system firing explosive shells from 20-mm cannon. If accurate, long-range airborne rockets are developed for interceptors, they can also be provided for heavy bombers. Whether or not this is enough protection will

(Continued on next page)



Prepare at P.I. A. for Big Opportunities in Aviation

SUCCESS in AVIATION depends on training at the RIGHT school. PIA, a governmentapproved school in operation since 1929, has grown up with Aviation and has students in attendance from all over the United States, not to mention countless graduates who are holding key positions in Aviation all over the world. We are PROUD of our PLACEMENT RECORD—We are DOUBLY PROUD of the fact that the majority of our new students come to us through recommendations by former graduates. Airline representatives seeking Aviation personnel regularly visit the Pittsburgh Institute of Aeronautics to examine graduating classes for qualified applicants. Almost daily, requests from small airport operators are being received for graduates with our type of training.

APPROVED FOR VETERAN TRAINING

Dr. T. B. Lyons, President and/or Treasurer-formerly Pittsburgh Public Schools-formerly General Mgr. of Graham Aviation Company-Phi Delta Kappa-member University of Pittsburgh Doctoral Association-Secretary Nat'l Federation Private School Associations-President of the Pennsylvania Association Private Vocational Schools-Listed in WHO'S WHO in American Education.

DAY AND EVENING CLASSES

MAIL COUPON FOR COMPLETE INFORMATION INCLUDING STARTING DATES OF CLASSES

PITTSBURGH INSTITUTE OF AERONAUTICS—Dept. B Aviation Bldg., 100 Seventh St., Pgh., Pa.
Name Age
Address
City State
☐ Aircraft & Engine Mechanics (A & E)
☐ Industrial and Aircraft Instruments
☐ Drafting & Design
☐ Aviation Secretarial & Airline Reservations ☐ Veteran ☐ Non-Veteran
- A- A-DANIAUTIAC

B.S., M.A., Ph.D. TTSBURGH

AVIATION BUILDING, 100 SEVENTH STREET, PITTSBURGH 22, PENNSYLVANIA - ATLANTIC 0800 FOUNDED 1929

T. B. LYONS, President

Combat 8 Miles Up

(Continued from page 45)

not be certainly known until a battle test. Altitude alone as bomber protection can act both ways, depending on the equipment available to the defense. If high enough, the bomber may out-stay and out-maneuver the relatively short-breathed turbojet-powered fighters, but this would not stop rapidclimbing rocket fighters which carry their own oxygen. Also the fact that there are few clouds above 35,000 feet favors the interceptor.

Darkness, on the whole, favors the bomber. Of course if its airborne radar equipment is sensitive enough to accurately locate its target from eight miles high, the enemy's ground radar will equally be able to pick it up. However, vectoring interceptors to the right spot by radar and radio communication and then turning the responsibility over to the interceptors' lightweight airborne radar sets is something else again.

Also at today's speeds visual sighting and firing are out-an automatic electronic and gyroscopic device is needed, with radar to track the bomber, a computer to figure relative speed, course, etc., and even radar to fire the gun at exactly the correct moment. We made a good start with this in the APG-radar series developed by the Bell Telephone Laboratories and other agencies. (A for airborne, P for radar, and G for gun-laying-APG-13A, or Falcon, was the best known of these.) It is hard to say what progress other countries are making in this particular development.

On the other hand, Air Force thinking is

laying a lot of emphasis on high speedwhich has always been of the utmost importance in military air operations-and high altitude as the best possible defense. It must be admitted that a piloted sub-sonic interceptor would have little chance of success against 500-mph bombers at 45,000 feet and up. (All speeds mentioned are of course true air speeds-at these altitudes the IAS would be considerably less.) On the other hand, supersonic high-altitude interceptor fighters would have an extremely good chance of success.

How about bombing accuracy from these heights? What's the use of hazardous, expensive missions if the strategic objective is not knocked out? Both bombs and radar bombsights have been improved since the war, and new bombsight tables are being worked out. The new bombs have to be true aerodynamically, with surfaces as smooth as the airplane that carries them; they no longer have contact fuses but are discharged electronically. The atom-bomb, while a strategic weapon, is not the kind of bomb that can be dropped into a pickle barrel from 45,000 feet.

Coming now to the human problems involved in high-speed, high-altitude combat, one of the items on the credit side of the jet-powered fighter is the wide field of view, resulting from the forward position of the pilot's or crew's compartment. This is of the highest importance as speeds increase, but this advantage may be partially lost if the promising "delta wing" layout comes into use for supersonic fighter types. Another credit item is the lack of noise and vibration of the iets.

If the pilot is to fight his aircraft to the

limit of his capabilities, he must not be cramped by inadequate head or leg room, or handicapped by bad positioning of instruments, switches and controls. Pressurized cabins are a must. Ejector seats with "quick disconnect" safety features, temperature control, ribbon-type parachutes and special "bail-out" oxygen equipment are now standard provisions. Accelerations of 6 to 8 g are now quite common, and present g suits (good up to 7 g for 10 seconds) are being improved. The Air Force has perfected a pressurized flying suit permitting pilots and aircrews to fly at altitudes above 60,000 feet and low pressures approaching a vacuum, and enabling them to escape from the aircraft if necessity arose. Yet the suit is sufficiently flexible for them to carry out their duties in comfort.

However, due to increasing speeds, altitudes and ranges making ever greater demands upon the human beings who fly them, there is a real possibility that piloted aircraft development may some day be halted because of the sheer inability of the human organism to tolerate the strains and stresses to which it would be subjected. Thus from another angle we arrive at what is the only sure answer to the need for a quick, lethal blow against a high-speed, high-altitude bomber—the guided missile.

Five years ago the Germans had three short-range ground-to-air missiles almost ready for operational use, with scores of others in various stages of development. If some of them were fully developed they would make all bombers up to 600 mph (and maybe all bombers) obsolete. Dr. Vannevar Bush (wartime head of the Office of Scientific Research & Development, and first chairman of the post-war Research and Development Board) thinks that in the very near future, because of anti-aircraft rocket missiles, "it may not be feasible to carry

many atomic bombs successfully to fully de-

fended and alert targets.'

Dr. Jack Northrop, in a thoughtful lecture some months ago, also stated his conviction that within a few years a defensive missile for ground-to-air interception will largely replace the manned fighter of today. "It will be rocket-powered and equipped with automatic devices for guidance to its objective. It will constitute the sole effective defense against mass attack from enemy long-range bombers or missiles," he said. A good example of this type is the Boeing GAPA (ground-to-air pilotless aircraft), development of which was begun in 1946.

In the meantime, however, the development of air-to-air missiles is proceeding apace. One of the most advanced is the recently announced Ryan Firebird (XAAM-A-1, meaning the Air Force's 1st experimental. air-to-air missile). Launched from an all-weather fighter such as the North American F-82 Twin Mustang or Northrop F-89 Scorpion, it seeks its target by means of radar navigational and electronic control system, exploding when it gets close. Initial impulse is supplied by a rocket booster, which drops off when the missile reaches top speed, after which built-in rockets carry it to its target. This adds up to another step in the trend to restore the edge of fighter over bomber. However, maybe the bombers will carry some Firebirds (or something better-literally dozens of such items are under development) to shoot down the fighters, and so it goes. Never a dull moment!

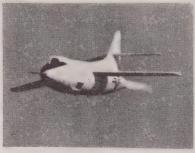
Speed: Over 760 mph



TEST PILOT Gene May calls flying faster than sound "easy as sitting in a chair"

IDED by rockets burning liquid oxygen and alcohol-water, the Navy's research plane, the Douglas Skyrocket, flew at a speed faster than the speed of sound at an altitude of 50 feet above Muroc recently. Test pilot Gene May was at the controls.

The speed of sound at sea level is 763 mph, while at 35,000 feet the speed of sound is 660 mph. Unverified reports have claimed Gene May has attained speeds near 1000 mph for seconds duration in the supersonic Skyrocket. This claim is not official, however.



DOUGLAS Skyrocket with May at controls flew faster than 763 mph at 50 feet

Fly IFR If ...

(Continued from page 35)

practice. Don't get stale. Many a pilot gets into trouble because he's let his technique become rusty and doesn't realize it.

3. Keep your radios in good working order at all times.

4. Don't file an instrument flight plan to a destination that, at some previous time, you haven't flown contact. It's darned important for a single-engine pilot to know what's underneath him at all times.

Maybe I've been fortunate, but all my instrument flights have been over flat country and, believe me, it contributes to your peace of mind. For my money, a pilot ought to think twice before filing IFR in mountainous country, and then stay on the ground—unless, of course, he's flown over that country many times under contact conditions.

5. When you file an IFR, always ask for pilot reports. They are a great help. Once, I was cleared to fly 500 feet on top from San Antonio to Dallas. "Weather" had informed me that I would be able to maintain 500 feet on top at 5,000 feet all the way. "Weather" also said I would pass over a mild cold front en route. I took off, flew into the overcast at 600 feet and climbed. When the altimeter read 5,000 feet, I was still in the soup. In fact, I didn't see daylight until I hit 9,000 feet. The stuff was rapidly building up, however, and that forced me to maintain a 90-mph climb. In addition to myself, the Bonanza carried three hefty passengers plus a lot of heavy luggage . . . and don't think for a minute that overload didn't show up when I found I couldn't climb any higher than 14,000 feet. I leveled off at 14,000, then spent half the time in the clear and the other half barging through the tops of the stuff.

Making use of the ship's VHF, I reported this cloud condition to San Antonio for the benefit of any other lightplane pilot con-

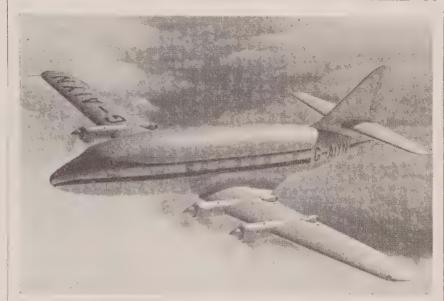
templating an "on top" flight.

Dallas was enjoying a 4,000-foot ceiling when we arrived, but for some unexplained reason we were held at 5,000 feet for a good 45 minutes. Down on the ground, I added that "When you ask for IFR, always ask for pilot reports," to my growing list of do's and don'ts about instrument flying.

6. Don't plan an IFR flight of over two hours duration. Maybe this will give you an idea of the why's of that statement:

From San Antonio once, I filed an IFR to Bryan, Texas, an hour's flying time away. The overcast was at 500 feet. I climbed the Bonanza up through and maintained 500 feet on top at 7500 feet. About five minutes from Bryan, we flew into contact weather, so I called Bryan Radio cancelling my flight plan, and we landed at College Station (Texas A & M) where I discharged my passenger. Immediately afterward, I took off again, circled the Bryan Range and filed a new flight plan for my return trip to San Antonio.

San Antonio was reporting a ceiling of 600 feet, but earlier weather reports had indicated that conditions would improve. The Bonanza had three hours of fuel available for the return trip, but I'd used up 15 or \$\ilde{\mu}\$20 minutes of it over Bryan Radio while "waiting for ATC clearance. At last came the clearance and I lined up for San Antonio, no delays expected.



ARMSTRONG-WHITWORTH APOLLO is Great Britain's second turbo-prop airliner to fly. Designed to operate over 1,000 mile routes, Apollo cruises at 305 mph

An hour later I was on top over San Antonio at 9,000 feet. I reported over the station and was told San Antonio had a ceiling of 700 feet. To make a long story short, they let me down to 3500 feet and held me there on a shuttle between station and fan marker for a solid 60 minutes. With 45 minutes of fuel left in the *Bonanza*, Approach Control informed me that Alamo Field now had 300 feet and a drizzle. This being below CAA minimums, I requested a change of flight to Austin which was giving 1,000.

Clearance was so slow coming through, however, I realized I would soon be out of time and fuel if something didn't happen. I knew I could just make Austin, but with no safety reserve. The possibilities didn't cheer me either. I knew the ceiling at Austin could drop and that if they decided to hold me, I'd be up that proverbial creek without a paddle. To make matters psychologically worse, when a *Bonanza* is down to 45 minutes of fuel, both fuel gages read "Empty."

Flying the soup with fuel gages screaming "Empty" isn't exactly a morale builder, so I picked up the mike and requested special permission from CAA to make a letdown at Alamo Field there at San Antonio. Two minutes later my emergency request was granted. I came right on in and parked "Six Zero Six Baker" for the day.

All this proves that a plane's normal fuel safety factor doesn't mean a thing sometimes. The Tower can hold you . . . and you can never bet sure how long. In fact, I'm of the opinion that the pilots flying single-engine ships in the soup aren't getting the consideration from the Towers they should get. A single-engine plane held too long is a ship that's lost its chance to even try for an alternate airport.

One time I was held over Houston for 50 minutes because some other pilot was making practice ILS approaches!

Caution No. 7 is to use extreme care when thunderstorm conditions exist. Be sure to get pilot reports and check in detail what's going on along the route of your proposed flights.

When thunderstorms are encountered, go

around them or down under if you can. Never, never go in them! If you decide to go under a thunderstorm, check the cloud base. Such storms have been known to drop to the ground in a hurry. If the base of the cloud becomes fuzzy, it's dropping. In South Texas, when the bottom drops out of a thunderstorm, the ceiling will fall from 6,000 feet to 1,000 feet in a matter of seconds. If you ever get caught in a condition like this, the best thing to do is to throttle back and let down with the storm. Slow down to around 130 mph. Even then you'll lose some paint. This suggestion is strictly a flat-country one. If you're over mountainous country, do a 180 . . . but quick.

8. In the late fall and winter, be sure to check on icing conditions. If you get a report of icing in the clouds and freezing drizzle, put your instrument ticket back in your pocket and forget you have one. Stay on the ground and live to be an old pilot.

All in all, instrument flying is comparatively the same in such ships as the Bonanza, Cessna 195, Navion and Bellanca if . and it's a big IF . . . you carefully choose your weather. Erratic weather conditions are unsafe, but if you have a spell of stable weather and an instrument ticket and a plane equipped for it, go ahead and make an instrument flight. It's good for a change and will keep you in good flying shape. Eight hundred-foot ceilings and cloud tops 3,000 to 5,000 feet are ideal. Anything lower and higher than that gets nastier in varying degrees. Let the chunk of instrument flying you do depend on your ability, judgment and confidence in yourself. I go for Pilot-Author Crawford's statement, "When in Doubt, Don't." That's a good slogan to fly by, and applies particularly to flying weather.

If you have the instruments in your plane and the ticket in your pocket, polish up on those gages by flying IFR on a cross-country even if the weather is nice VFR stuff. Those gages your plane is equipped with and your know-how in using them could someday make the difference between getting to your destination okay . . . and not retain the property of the state of th

getting there at all.

Fly The Hillercopter

(Continued from page 24)

customed to crossing the fence at 75 mph in a fixed-wing plane, no wonder it's difficult to learn to back up and land in a ballpark."

Along one wall of Hiller's office is a mural showing the seven different helicopter designs that "The Boss" has worked on since 1939. On a stand nearby is the model of a vertically-launched man-carrying rocket. In the reception room a bulky stack of San Francisco newspapers tell in screaming headlines of the spectacular rescues made with the Hillercopter. It's quite a layout!

At least two dozen planes were under construction as we walked through the plant and toward the flight line. Tied to the rafters were two prototype single-place planes.

Out on the flight line we were introduced to the Hiller "360." Starting with an unconventional airplane-if you choose to call it that—the Hillercopter has incorporated so many new ideas that it's tough to decide where to begin. Probably the most outstanding feature of the "360" is its novel control system that makes stable, hands-off flight a reality. Through a surprisingly simple overhead control stick, the Hillercopter pilot moves small servo-tab rotors. These foot-bya-foot-and-a-half airfoils control the larger 17½-foot main blades. There are no pulleys, cables or heavy linkage between the pilot and the actual control surfaces. This saving in weight and moving parts pays off in lower cost, less maintenance and extra passenger.

A horizontal stabilizer is mounted near the tail rotor and looks like a pint-sized conventional elevator. This fixed surface gives stability for cruising flight. And normal attitude basic stability, achieved by the "Rotormatic" control, is one of the top selling points of the Hiller. Recently a national picture magazine ran a photo of an as-yet unlicensed competitor, stating that it was the only inherently stable helicopter in existence. In answer to that contention, two of Hiller's pilots took off with a photographer accompanying them in another ship. At a thousand feet both pilots climbed out of the seat and hung unto the motor mounts while the "360" flew along for several minutes with no one at the controls.

C. L. Washburn explained that the basic controls are the same as a conventional airplane. The difference comes in the throttle and the "collective pitch control." Actually this "collective" is the "upper and the downer" that changes the angle of the main blades. When you pull up on the "upper," the angle of the blades increases and you go When the collective is depressed, you go down. This pitch control is located between the two pilot's seats and is partially linked to the throttle. Normally, you add more power when you want to go up, so you pull up on the "upper" and the throttle at the same time. To go down, push down on the throttle and the pitch stick.

Simple, isn't it?

The Hiller "360" is all metal except for laminated spruce rotor blades. Leading edges on the main blades are covered with metal and the remainder of the blade is fibre-glass covered. The factory guarantees each set of blades for at least 3,000 hours.



INHERENT STABILITY of the Hiller "360" is shown in this photo recently made. Note both pilots are out of their seats and are hanging on to motor mount. They rode this way some time

"What if you hit a bird in flight?" we asked.

"We've tested these blades on the ground by throwing dead birds into the whirling rotors and they merely decimate the birds. Our pilots have deliberately tried to run down birds in flight, but they always seem to evade the whirling blades," explained Washburn.

After walking around the ship, we climbed into the cockpit and hooked our safety belt. That's all there is between the seat of your pants and all outdoors. Because of the weight saved in its simplified-control system, the Hiller "360" is licensed for three people. The seat is 4-feet, 9-inches wide with dual controls in the center and lefthand seats.

The control stick comes down from the main rotor head and is a bicycle handle-bar affair so that either pilot may fly. Dual rudder pedals are placed on the floor with the throttle and "pitch stick" mounted between the center and lefthand seats. Later models will have two complete throttle units to eliminate the hand-holding required during dual instruction with the present single power and pitch control. Parking brakes are located on the instrument pedestal while the trim-tab wheel is located in the middle of the handle-bar control stick.

Twin needles on the tachometer show both the rpm's of the engine and the main rotor. On take-off, the 178-hp Franklin engine—the only small powerplant yet licensed for vertical operation—turns 3,000 rpm while the main rotor blades turn only 327 rpm.

Mr. Washburn snapped the switches, pulled the starter and the engine began to fire. As the engine picked up speed, the blades of the rotor began to revolve slowly.

"The mercury clutch and single planetary gear-box cost us \$4,000 each on the first four ships," explained Washburn as the ship warmed up. "We've tried wherever possible, however, to use regularly manufactured parts. The universal joints in the tail rotor, for instance, can be obtained through Willy Overland dealers."

As the temperature gages crawled up into the green, Washburn eased on more power and checked the mags. Then he released the brakes, kicked rudder and swung the "360" into the wind.

"I'll make the first take-off and turn it over to you in the air," he said.

Our heliport was a graveled square about

half the size of a basketball court. There was a cold, steady wind whipping around the corner of the box-like factory building and the 0-to-100 mph airspeed indicator whipped up to 20 mph before we began to move.

Washburn eased up on the throttle until the tachometer showed 3,000 rpm. Only after the main rotor blades showed over 327 did he pull up on the collective pitch stick. The weight came off the shocks and we climbed straight up to about 20 feet. Then Washburn eased forward on the control stick and our airspeed began to pick up.

"Feel the acceleration," Washburn shouted over the noise of the engine and rotor blades.

We shot from 30 to 70 mph in half the time it took to read this sentence. The acceleration was absolutely fantastic—just as though the *Hillercopter* had hooked itself to a skyrocket. All this time the nose of the ship was pointed toward the ground a scant 100 feet ahead of us. The thrust from the main rotor, however, was both up and forward so that we were getting full benefit of the horsepower in a forward direction.

At 70 mph, Washburn eased back on the control column and we zoomed over the power lines surrounding the field. We climbed at 800-feet-per-minute until we had a thousand feet over the tide flats near the Dumbarton Bridge.

Washburn rolled the trim tab on the control column and then let go of the controls. "It's all yours," he grinned.

Gingerly I took over the controls and felt them out. In level flight and normal turns the ship behaved much like a conventional airplane though there was a slight lag in the controls. Holding altitude during turns was difficult until Washburn explained that the change in pitch of the torque rotor either adds or takes away power from the main rotor. In right turns, the main rotor loses up to 50 rpm because of the increased load on the tail rotor. Conversely, left turns result in a climb unless the pilot closes the throttle slightly. When you rock back and forth on the ailerons, you feel exactly like the pendulum on a clock because you pivot from the rotor hum and the cabin swings easily from side to side.

N8105H was a standard model without a cabin enclosure and not the warmest piece of flying machinery in the world. To obtain the greatest rayload, most operators order

(Continued on page 50)

Pilots Report: Piper Pacer

(Continued from page 18)

cabin, auto-type press-down-to-lock buttons are installed on the inside of the two doors, with a key lock on the outside of the front door.

Anxious to get aboard the Pacer for a trial flight, I gathered chute, knee pad, coats, gloves et al, and slid in behind the wheel via the step just below the door. (Although I was dressed in slacks for the occasion, climbing into the cabin could be femininely accomplished in skirt attire.) Across the bottom of the panel, left to right, are ammeter, radio, lights, parking brake, carburetor air, key-type ignition switch, throttle, primer, mixture, cabin heat and head-set plug in. The panel is simply laid out with the various knobs and switches distinguishable one from another. There is an overhead speaker and cabin light switch. The standard instruments provided are rpm, airspeed, compass, altimeter, and a combined oil temperature and pressure gage. The top of the instrument panel forms a shelf extending below eye level, one and a half feet forward to the windshield, affording generous visibility. Looking straight over the nose, the ground area from a point 35 feet directly in front of the airplane is in the field of vision. The front seat is adjustable forward and back. The test model is equipped with a single safety belt for the two seats. However, separate seat belts will most likely be required on the production model. Glove and map compartment is on the far right.

The Safe Flight Indicator light is located forward on the flat top of the instrument panel. The flap handle is within easy reach on the floor between the seats, and it provides three positions: up, one-half, and full flaps. Flying from either seat in the Pacer is intended, with provisions made for complete dual controls including toe brakes. With the five-hour-plus range, and from a training airplane standpoint, this two-pilot provision is an asset eliminating the need for enroute seat changing.

With gas "ON" left tank, mixture "RICH," throttle cracked, two shots of prime for the hot engine on a cold day (outside air temperature 40°), the toggle-type master switch is flipped with a finger of the left hand. The battery and starter switches are located below the pilot's seat on the left. Pressing the starter button and letting the prop turn over two or three times, the key is then turned to "BOTH" mags for starting.

Taxiing the airplane from the factory to the field over bumpy, hard ground, Jay really let it go to show the shock-absorbing quality of the new Hydrasorb oleo and shock cord landing gear installation. Ground directional control is good with a turning radius the span of the wing! Take-off check is accomplished without a clutter of gadgets, entailing only a quick pass from left to right over the instruments, and carburetor air "COLD," mixture "RICH," flaps-up for normal take-off, and elevator trim wound to zero by the handle overhead. After control travel and power check, I pulled onto the runwey and opened the throttle to full power at 2400 rpm (full rated power for the production model is at 2600 rpm-a climbing prop was installed for test purposes on the Pacer I flew).

In a short run of 350 feet the plane was off the ground just above 40 mph Indicated, heading up in a steep 1500-feet per minute initial climb and still going up at a 1,000-fpm rate, 65 mph Indicated, when the altimeter was swinging past 4500 feet (Cub Haven airport: 555 feet above sea level). With Jay and me, plus chutes, our load was very light but the Pacer performance will still give you a good 850-fpm rate of climb at gross weight, indicating 87 mph. Torque is noticeable with the 125-hp powerplant at slow airspeeds.

Leveling off between the scattered snow clouds at 4590 feet over Lock Haven, I started a check on the handling qualities of the Pacer. Light aileron pressure is required and the rudder responds to comfortable foot pressure, but the elevator force per g is a good deal higher, requiring a definite effort to hold the nose in a 3 g bank. While a minimum of exertion in control handling will lessen fatigue, it is a safety factor if a noticeable effort must be made to pull the wheel back, i.e. if a novice pilot were to get in trouble and try to check high speeds by yanking back on the stick, it would be physical exertion (30 pounds per g) for him to create a load sufficiently high to cause damage to the wings.

Trimmed for level flight, I applied elevator control sharply. (Continued on page 64)



1		
	Dean of Enrollments - Dept. 93 Embry-Riddle School of Aviation Miami 30, Florida	∏ A.
	Please Print	E A.
	ADDRESS	Co
	City	□ Dı
Į	State Age	Check

&E. Combined with

mmercial Pilot ying Mechanic* afting & Design

TRAIN IN MIAMI -- AIR CAPITAL OF THE WORLD

Fly The Hillercopter

(Continued from page 48)

the open model which is similar to flying an old Curtis pusher. You're right out in the open when seated on the left and your coattails are flapping out over a thousand feet of thin air.

A convertible plexiglas cabin canopy is available as an accessory. So are landing and navigation lights, pontoons and hoppers for dusting and spraying. Even an Aerosol dispenser may be attached, making the "360" probably the biggest Flit-gun in existence.

After a couple of minutes in the air, Washburn said, "That's fine. Now let's stop up here and see if you can make a vertical descent for a few hundred feet."

We pulled back on the control stick to kill our forward speed and eased down on the collective pitch stick. The nose of the helicopter came up and our forward speed dropped. Shucks, this was going to be easy! Then we stopped and started down. Then we began to back up! We pulled up on the "upper"—and that wasn't the thing to do. With the 'copter parked nose high, the thrust from the rotors was back toward the tail and adding power made us back up all the faster.

"Better let me have it for a second," said Washburn with a grin.

He eased forward on the control column to stop our backward motion and then cut down on the collective control a little to aid in our descent.

"Now try it again, but don't use so much control."

The control touch on the Hiller "360" is very light and almost completely free of

vibration but, as in all rotary-winged aircraft, there is just a split-second lag between the movement of the control and the reaction of the airplane.

I'd inch the controls around, and when nothing would happen at once, I'd use a little more control. Just about that time the original control would take effect and be followed almost immediately by the added movement. Result—we were all over the sky. You must fly a little further ahead of your controls in a 'copter than in the average conventional aircraft.

Another fixed-wing habit that kept getting me into trouble was the tendency to pull up and back on the throttle to reduce power, not to add it. After several hundred hours in twin-engined transports, where you push forward and away from you on the throttles to increase power, I had to stop and think before I pulled up and toward us to add power. However, the longer you fly this system, the more natural it becomes. To go up, you simply pull up and add more power.

We practiced this standing still in the air for nearly five minutes. It was so exasperatingly easy to overcontrol and the split-second that elapsed while I tried to remember what to do made things worse. Eventually, however, it became easier and more instinctive to subdue the wild gyrations of the 'copter.

"Now let me show you an autorotation landing—that's what you'd call a 'dead-stick' landing in a regular airplane," said Washburn. "You come in high like this," he said as we circled downwind of the factory. "Then cut the throttle all the way down."

It was very quiet.

"Establish a fast, steep glide of about 50 mph. As you get down close to the ground,

come back sharply on the stick to stop your forward speed and the momentum of the rotor blades will let you down easily.

"If you have either 200 feet of altitude or more than 30 mph forward speed, you can establish an autorotation glide and make a fully controlled forced landing. Actually, the ship will sink vertically at about 18 feet per second with the power off. That's just a trifle faster than the landing gear will take. A parachute with a normal person drops about 12 feet per second."

Washburn landed on the home mat and made it look so easy.

"Now you make the take-off," he grinned. I eased up on the throttle to the required 3000 rpm, hauled back on the pitch stick and the *Hiller* hopped into the air. Then the trouble began. Instead of easing the nose down and picking up that ever-lovin' autorotation speed, I flubbed around and let the gusty wind push us backwards and sideways. Naturally, I overcontrolled. Finally I pushed the nose down enough to pick up a little forward speed and wallowed off across the field. It wasn't neat, but your reporter finally established a climb and pulled away from the airport.

"Now take it around and land it," said Washburn.

We circled the field at 500 feet and squared away into the wind. Then I inched down on the collective control and tried to maintain a 50-mph partial-power glide.

"Break your glide at about 50 feet and then hover over the field while you get the feel of the ship at zero airspeed," said my instructor.

Coming in for a landing, I'd have sworn the heliport was a shrunken postage stamp. I eased back on the stick to cut our forward speed. Then the control column went forward again so that we wouldn't back up and a little more pitch and power was added to stop our rate of descent. Finally the 'copter stopped—for a moment.

Each time it seemed as though we were finally hovering gracefully, a gust of wind would come along and make the egg-beater skate first one way then the other, and I'd have to start in wrestling with the controls again to regain our spot over the heliport.

It seemed like a week, but after a few perspiring minutes, I was able to park the 'copter over its landing site within a radius of 50 feet. I'm forced to a'dmit, however, that I felt like a drunk walking across Broadway against a red light on an icy night.

"OK, now let's go down and land," said Washburn.

Off with a little power . . . correct for gusts . . . add a little power and forward stick to keep from backing up . . . not too much or you'll overcontrol and there you are, a foot off the ground and standing almost still. That's good enough, you think as you push down quickly on the collective to cut the throttle and spill the lift from the rotor blades. The 'copter lands, but with a thump.

"Next time fly it all the way to the ground," admonished Washburn.

We sat a minute to drain some of the tenseness from my arms and then up we went to try it all over again. In a helicopter you can make two kinds of take-offs, either jump or running. A running take-off requires slightly less power. The Hiller "360" can make a jump take-off at an altitude of 8,000



Jet Airliner

One of the first jet transports to fly was this A.V. Roe Canada Limited C-102, a 50-passenger medium-range airliner powered by four Rolls Royce Derwent 5 turbine engines. Designed to fly high and fast, the ship's top cruising speed is 427 mph at 30,000 feet with an all-up weight of 60,000 pounds. Normal range with 50 passengers, baggage and other allowances is 500 miles. The Jetliner has a wingspan of 98 feet 1 inch.

feet with a full load, but can take-off from 10,000 feet if a short roll is available.

On our next take-off, we let the ship taxi into the wind and then pulled up on the "upper." In taxiing forward, you push the stick all the way forward and add power without pulling up enough on the pitch stick to lift the ship into the air. A running take-off is easier to make than the vertical type so we had a little less trouble.

Each take-off gave us the same terrific acceleration from 30 to 70 mph. We pulled up, circled the factory at the normal cruising speed of 76 mph and squared away into the wind again. At a hundred feet we leveled off and stopped. Don't kid yourself—when you're accustomed to flying conventional airplanes that remain in the air solely by their forward speed, it's really something new and hair-raising to park up in the air and even back up if you wish.

With a lot of verbal instruction, pertaining mostly to overcontrolling, I eased the "360" down toward the ground. As you become more familiar with the control system and the feel of the 'copter, it becomes sort of a game to see if you can hold the ship in exactly one spot and make it meet the ground without a jar. I finally put it down again, but the jar was still there.

The helicopter may develop a race of tall, stoop-shouldered pilots. If the rotors are turning, a pilot should stoop down when entering and leaving the helicopter. While there is ample clearance from the 9½-foot rotor head, the blades droop slightly as they slow down and, should the 'copter be parked in a slight hollow in the ground, an unwary pilot could get a permanent haircut if he walked into one of the spinning blades.

Aside from such obvious jobs as powerline patrol, air mail delivery, crop dusting and photo work, the Hiller "360" is being used to carry 150 pounds of geophysical equipment for mineral research in Arizona. deliver oil drilling parts to off-shore wells in Texas and Louisiana and spot schools of fish for a San Diego tuna clipper.

Just recently the Hiller has been involved in two spectacular rescues. When the 12-year-old son of a San Francisco attorney was thrown from his horse at Benson Lake, 8100 feet above sea level, in Yosemite Park, one of Hiller's test pilots successfully flew the boy out to a hospital after another manufacturer's helicopter had been unable to take-off at such high altitude.

Pilot Jay Demming made this spectacular rescue in a brand new production model Hiller that had been flown only 40 minutes test time before being towed on a trailer to the National Park for the rescue attempt. A ram-air duct on the carburetor intake of the Hiller gave 22.7 inches of manifold pressure compared with 19 inches without the intake scoop to aid in this high-altitude

In another headline story, pilot Ted Leopold was dusting in a Hiller near the beach south of San Francisco. Fisherman Fred D. Loretz was swept off the rocks by rising tides and a burly Coast Guardsman swam through the surf to save the fisherman. The Coast Guardsman was able to keep him afloat but he was unable to bring him to shore. Bystanders rushed to the field where the Hillercopter was dusting and advised the pilot of the fisherman's plight. Using the rope that tied the helicopter to



CONTROL STICK position is here demonstrated by the author's wife. Small wheel in center of the handle-bar type control stick is the Hiller's trim-tab wheel. Note dual rudder pedals

its trailer, pilot Leopold took off and circled the beach. He still had his dusting hoppers aboard as well as nearly full gas tanks. After hovering over the two men in the water, the pilot felt a tug and assumed that one of the men had caught the dragging rope. He applied full power, pulled up and flew his cargo to the nearby beach. Only then did he know that he had pulled both watersoaked men from the ocean. Initial loads were so heavy that one strand of the four-ply rope parted, but the rescue was completed safely and Leopold went back to his dusting job.

Flyaway price of the Hiller is \$19,995, by far the lowest cost for a licensed helicopter today. A factory breakdown of operating cost shows that the ship can be flown a thousand hours a year for \$24 per hour. This figure includes the pilot's salary, insurance, depreciation of the 'copter spread over a three-year period, taxes, fuel and oil, maintenance and spare parts. Current rental charged by helicopter services is \$50 per hour.

Should any fixed-wing pilot want a helicopter rating, a 20-hour course is avaliable for an even \$1,000. The CAA flight test at present includes the following maneuvers.

- 1. Preflight inspection and procedure.
- 2. Taxiing.
- 3. Vertical take-off, Ascent to 10 feet, Hovering flight, Vertical landing.
- 4. Crosswind vertical take-off. Ascent to 10 feet, Hovering flight, Vertical landing.
 - 5. Running take-off.
 - 6. Jump take-off.
- 7. Hovering turns of 360° over a spot,

right and left.

- 8. Fly a 50-foot square pattern, maintaining a constant altitude and parallel heading.
 9. Fly a 50-foot square pattern, maintain-
- ing a constant altitude and constant heading.

 10. Transition from hovering to forward flight, maintaining constant altitude and
- flight, maintaining constant altitude and heading.

 11. A 180° downwind turn from rearward
- flight through O airspeed.

 12. Climbing and gliding moderate turns.
- 12. Climbing and gliding moderate turns maintaining a constant airspeed.
- 13. Rapid decelerations or quick stops from cruising, maintaining a constant altitude.
- 14. A 180° side approach simulated autorotative accuracy landing.
- 15. Accuracy power-glide approach to a predetermined spot.
- 16. Simulated autorotative accuracy approach straight ahead to a predetermined spot.

If you can do all this, you're a licensed 'copter pilot.

Financing this Hiller project has been something unique in present-day aviation. Although the Navy has purchased one Hiller "360" and the Air Force has contracted for the use of one for evaluation tests, the entire Hiller project was paid for through a private sale of \$2,000,000 of stock.

If you look up at the passing helicopters with a tinge of old-fashioned suspicion, as we did, don't make up your mind to condemn them until you have a chance to fly one. You'll hum a different tune and like it.

It's an education in aviation, this king-sized yoyo where the pilot pulls the string.



Royal Canadian Air Force

Cross section of types of planes in use by RCAF is shown here. Tailless glider is research ship. Other planes are: De Havilland Vampire, North American Mustang, Noorduyn Harvard, North American Mitchell, Lockheed Ventura, Douglas Dakota, Avro Lancaster

Use Altimeter Setting

(Continued from page 34)

to make a drift correction to the left.

Any wind may be divided into two components—the crosswind component and the tailwind or headwind component. The preceding example illustrates each of these components. In the Elkins flight we find a tailwind component, but no crosswind. In the Buffalo flight we find a crosswind component, but no tailwind or headwind. Most flights will have a little of each, part crosswind, part tailwind or part headwind. This is simply because most flights are not made exactly parallel to or exactly perpendicular to the isobars.

The crosswind component is that portion of the wind which causes drift, and requires the compensating drift correction angle (DCA) which you apply to your magnetic course to get magnetic heading. The headwind or tailwind component, of course, increases or decreases your ground speed whichever the case may be.

Fortunately, the component which is of most vital concern to the pilot is the crosswind component, and I say "fortunately" because this is the easier to find. From this figure, the drift correction angle is easily computed.

The actual force of the crosswind component is determined by the pressure difference between two stations lying along the course. Accordingly, the crosswind varies directly as the pressure difference.

The value of the head or tailwind component is determined by the pressure difference between two stations lying at right angles to the course to be flown.

In addition to the difference in pressure between two stations, we must consider the distance between these stations. Obviously a pressure difference of .10" between two stations only 100 miles apart will produce a much stronger wind than a difference of .10" between stations 200 miles apart. The crosswind component will vary inversely as the distance between the stations.

Given a particular pressure difference over a certain distance, we should be able to compute in miles per hour the crosswind component which exists along this course. With one more consideration we can. Latitude is this last variable. The wind velocity varies as the sine of the latitude.

For instance, a particular combination of pressure difference and distance may produce a 10-mph crosswind at 60° latitude. But the same conditions at 25° latitude would result in a 20-mph crosswind.

To obtain an actual value for the crosswind component, we must consider the following points:

The crosswind component varies:

- 1. Directly as the pressure difference.
- 2. Inversely as the distance between stations.
- 3. Directly as the sine of the latitude.

All of these considerations may be put into a formula, and from it we can determine the strength of the crosswind.

As a pilot you know that to be usable a navigation system must have speed, simplicity, and convenience. A formula, of course, gives none of these. However, solution of a problem of this type can be greatly simplified through the use of tables, graphs or, as we have elected, by a computer designed specifically for this purpose. With this computer the complete problem of obtaining DCA may be solved with but two motions of the computer—about 10 seconds, with no plotting required. The computer itself has been so simplified that it is actually self-explanatory. However, for those not acquainted with the computer here is

a sample problem to show how it works. Given:

Altimeter settings:

Departure point 30.00" (inches mer-Destination 20.92" cury)

Difference in pressure .08"

(Note that we are flying toward the lower pressure)

Distance between stations
Latitude (approximate)
Airspeed

200 miles
40° N
120 mph

Rule I—Set distance between stations (miles) opposite pressure difference (difference in altimeter settings.)

The computer shown on page 34 is set up for this problem. You will note that we have set the difference in altimeter settings (.08") on the outer scale directly opposite the distance between stations (200 miles) on the next inner scale.

Rule II—Set Latitude Index opposite Latitude.

The Latitude Index (which is just to the left of the word "Airmen") is set opposite our approximate latitude, 40°, on the latitude scale. Anywhere within 2° or 3° is satisfactory for normal operations.

Rule III—Read Drift Correction Angle opposite airspeed (mph). (For magnetic heading, add DCA to magnetic course if flying toward high pressure; subtract if flying toward low.)

Now we have simply to read the DCA opposite our airspeed. The airspeed scale is just to the right of the word "Airem." Cruising at 120 mph, we find our DCA to be 8°.

Since we are flying toward a lower pressure, (departure point altimeter setting—30.00" destination altimeter setting—29.92") the wind will be from our left, and we must correct to the left, or into the wind. An easy way to remember this part of the rule is simply that "lower" begins with an "L" and so does "left."

This is the basic pressure-difference problem solved by computer in one, two, three order. And these three rules are all printed on the face of the computer—just in case you should forget. The computer will solve other problems too, including the routine speed-time-distance and fuel consumption, but this pressure-difference problem is the basic one for which is was designed.

In addition to substantially greater speed and convenience, pressure-difference navigation has certain unusual and fundamental benefits. In the first place, with pressure-difference navigation you are working with up-to-date information. Pressure differences need never be more than one hour old. In contrast to this, wind aloft observations are at least two hours old and may be up to eight hours old by the time you use them. Accordingly, many pilots are basing their flights on obsolete wind information. No pilot needs to be told how serious this can be.

Witness this pilot's report:

"—An interesting case occurred on March 22nd (1949) when I flew from Shreveport, Louisiana, to Tulsa, leaving Shreveport about 7 o'clock in the morning. The weather Bureau gave the following winds at that time:

Shreveport 280°—23 knots Tulsa 320°—20 knots

"Putting this information on my (conventional) computer, I came out with a drift of 8° to the right for my *Bonanza* airplane flying at 3,000 feet Indicated altitude. This

drift would have been true for the first part of the trip and would have tapered down to no drift at all at the Tulsa end of the journey.

"The Shreveport altimeter was 29.90, and the Tulsa altimeter was 29.94". The distance is about 280 miles, and working this problem on a pressure-difference computer gave me a correction angle of 21/2° to the right compared to the winds aloft correction angle of 8° in the opposite direction. I flew the course entirely by pressure-difference computer and for the first 80 miles or so I could see the ground, and found that my track was almost precisely correct, though it was perhaps a few hundred vards to the left of course at the 80-mile point. After 80 miles, I went on top of a low overcast and I didn't see the ground until about three miles from the Tulsa airport. During nearly 200 miles of this flight I was just on top of this low overcast and could not possibly have cheated, navigation-wise, and as there was no beam on this course, I could only check with my loop aerial to see how it was working out.

"When I came off the edge of the overcast, about three miles southeast of Tulsa, I was headed directly for the center of the airport and I would have missed the airport center by less than a hundred feet if I had gone straight in.

"The interesting item in this particular case was not extreme accuracy of pressure-difference computer results on this flight, but the fact that the winds aloft information was apparently in substantial error, and had I taken the old-fashioned method I would have been very far off course to the left in this particular case. This flight having been made from 7:00 o'clock to 9:00 o'clock in the morning, suffered because the latest winds aloft information was several hours old. The altimeter settings were, of course, much more up-to-date information and, apparently, accounted for the superior accuracy of pressure-difference flying."

An even more striking advantage pressure-differences have over conventional winds-aloft information is evident when we consider that wind-aloft observations depend on visual observations of a free balloon. Consequently in low ceiling, poor visibility or precipitation conditions, the observations cannot be made. Yet this is the very time a pilot most needs pre-flight wind information. Pressure-differences are always available, regardless of weather conditions. Moreover, they tend to become even more accurate as the weather gets worse. In short, they don't let you down when you need them most.

Winds-aloft reports are confusing at times when stations along the course report winds from differing directions and of differing velocities. Confusion comes when trying to average these winds or in determining just where you will encounter the wind shift. Pressure-difference flying automatically gives the pilot an average bearing to fly, taking into account any wind shifts which may exist en route.

Navigating with regular winds-aloft reports usually requires a rather bulky computer and necessitates the plotting of points on a special navigational side. This involves reading fine lines, usually close together. For this you need good lighting, plenty of room and two hands. Pressure-difference navigation, however, uses only a pocket-size computer

AERONAUTICAL UNIVERSITY

You will make no mistake in choosing Aviation for your future career.
 Tremendous opportunities are in sight—and those who are best trained will get top positions.

Prepare for your entrance into key positions in Aviation by intensive training at one of the oldest recognized aeronautical schools in the country. Courses in:

- AERONAUTICAL ENGINEERING---B.S. DEGREE
- AIRPLANE AND ENGINE MECHANICS
- SPECIAL A. AND E. MECHANICS REFRESHER AND COACHING COURSES FOR U.S.C.A.A. EXAMINATIONS
- AVIATION ADMINISTRATION
- AERO ENGINEERING DRAFTING

(Tech. Inst. Curriculum approved by Engineers' Council for Professional Development)
Founded by Curtiss-Wright, Outstanding faculty, modern equipment, Day, evening, Placement service.

APPROVED FOR VETERANS' TRAINING

(21st Year)

AERONAUTICAL UNIVERSITY

Dept. 1070, 116 South Michigan Avenue, Chicago 3, Illinois

Please send me your free catalog, Opportunities in Aviation, and full information

about the following courses:

Refresher Course

☐ Aero. Engineering
☐ Airplane and Engine Mechanics

☐ Aviation Administration ☐ Aero. Eng. Drafting

Nama

Address

All Pilots Will Want This Useful, New Book "ELECTRONIC NAVIGATION"

by Lieut. Col. L. M. Orman, U. S. Army

An indispensable aid for the modern navigator. Tells and shows in 213 authoritative pages how to get the most out of your electronic navigation equipment. Gives you theory and practice of Radar, Loran, Consol, Decca, Instrument Landing Systems, Ground Controlled Approach and other systems of electronic navigation. Operating instructions, installation and maintenance procedure included. The first and only book of its kind. Get your copy at book stores, your aviation supply dealer, or order direct by sending check for \$4.50 to address below.

Other Weems Navigation Aids You May Need

Weems Mark II Plotter—\$2.00

Dalton E-6B Computer—\$10.00

Dalton Mark VII Computer—\$5.00

Instrument Flying, Weems & Zweng—\$4.50

Air Navigation, Weems—\$3.75

Practical Manual of E-6B Computer—\$2.00

"SEE YOUR AVIATION SUPPLY DEALER"

Address Dept. 21, Weems System of Navigation Annapolis, Maryland

Weems Air Navigation School

Est. 1927. Resident and Correspondence Courses. Write for details. Enrollment approved under G. I. Bill.



and requires no plotting, one hand, never more than two movements, and no fine-line reading.

With pressure-difference navigation it is a simple matter to so reduce the problem for any particular route over which a pilot flies frequently that no computer will be necessary. Given two altimeter settings you can mentally determine the correct DCA almost as soon as you can read the altimeter settings. For instance—

Assume that a pilot flies the Boston-New York route fairly regularly and that his cruising speed is 160 mph. On his first flight he may have the following conditions:

New York altimeter setting—29.90"
Boston altimeter setting—29.80" or a dif-

Boston altimeter setting—29.80" or a difference of .10".

The distance is 190 miles; the latitude 42° .

Following the rules on the face of the (Continued on page 58)

Whip-Stall Save

(Continued from page 19)

plants in that area which give off a consistent industrial "fog."

We climbed the Waco to 4,000 feet, levelled her off, then began the flight maneuvers. The student had learned his lessons well for the most part and he executed some nice loops, spins, snap rolls, vertical reversements and half snaps. The only maneuver that didn't please me too much was a slow roll, so I asked the boy to try another one.

Half way through the slow roll I felt a decided thud and immediately the plane began to shake from prop to tail, wing tip to wing tip. Being the Examining Inspector, I was riding in the front cockpit, and from that position it was difficult to determine what was causing the airplane to vibrate so severely.

This was no time for a student to be on the controls, so I took over and tried to roll the airplane back into level flight. But when I tried to apply rudder pressure, I found I couldn't budge it.

My next thought was how to get the airplane back to straight and level without rudder. When I tried a split S from the inverted position, the ship came out in an inverted diagonal dive, then finally started to climb rightside up. But I couldn't hold the ship straight because the rudder seemed to be locked to one side . . . and I still didn't know the cause of the jammed rudder.

By holding a great amount of opposite aileron and reducing the power, I was at last able to get the airplane flying in a level position, with the stick way over in one corner and the rudder jammed far over in the other.

Holding the ship in that position, I began looking the situation over. The wings, center section and ailerons appeared to be in good working order, but when I looked back over my shoulder it didn't take much more than a glance to see what had happened.

One of the seat cushions out of the Waco was lodged between the vertical fin and overhang on the rudder. Apparently when we were inverted in that last slow roll, this cushion which the student had placed behind his back to make him sit further forward had slid out from behind him and become lodged in the rudder. No amount of pressure on the rudder would loosen it. In fact, the more pressure I applied, the tighter the seat cushion seemed to become.

By this time the vibration of the airplane was beginning to give me the creeps and I wondered how long the ship would hold together. Something had to be done quickly . . . but what? I tried a couple of more times to dislodge that cushion, but nothing happened, except that I realized I had to make a decision. Either I had to tell the student to jump, and I'd follow him out; or I could try one more maneuver . . . a severe whip stall. My hope was that when the whip stall forced the ship to slide backwards, the reverse pressure would force the rudder open and allow the cushion to fall free. I decided to try it.

At this point, believe me, the perspiration was rolling off me . . . and I'm certain it wasn't just gliding off the student either. Slowly I brought the ship up to what appeared to be a very steep angle, but just as I neared the angle I thought necessary

Mike Lights

NE of aviation's latest safety devices is a system of turning on an airport's lights by simply pressing a transmitter microphone button. Called the Airport Radio Light Control System, this device is now in operation at the Bellflower (California) Airport. A pilot flying from one to 25 miles from the airport can turn on the runway lights even though the field is unattended. The pilot merely presses his radio's transmitter microphone button seven times in fast sequence. The field lights come on, and they will stay on for periods up to 30 minutes. A series of radio tubes and adjustment dials installed in the airport tower do the trick. If the lights should go out again before the pilot gets in, he just gets on the mike button another seven times and . . . presto, the field lights up!



FIELD MANAGER J. F. Walker of Bellflower Airport demonstrates how he presses mike button in his Stinson Voyager which turns on the airport's lights



for a whip stall, the ship stalled out and fell off. My heart wasn't in my throat then, it was right up with my teeth as I saw myself spinning in a ship with a locked rudder.

Luck was with us, however, and by neutralizing the aileron and getting the stick forward I was able to stop the spin and eventually get the Waco back under control. We ate up a lot of altitude in that maneuver, though, and so had to go back through the process of slowly gaining footage between us and terra firma.

Once more I considered the bail-out proposition. It was a cinch neither the student nor I wanted to jump from a spinning airplane, which was a possibility if the Waco stalled out again, but neither did we want to leave the ship right then. So, with a nod from the student, I tried the whip stall all over again.

Once more at 4,000 feet, I pulled the Waco up in as nearly a vertical climb as I could get it, and then pulled off the power.

Boy, it's a helpless feeling to sit there for a second as the ship starts to slide back on her tail! In the next instant, though, it whipped over with such terrific force it sent us straining against the safety belts. It was just as thought some big hand had come up, grabbed us by the collar and snapped us into the next county. I took a breath or two, then tried the rudder.

It was working!

The cushion no longer was lodged between the rudder and the vertical fin. With a sigh of relief and a shudder of nerves, I looked around to see how the student was making out. He was the color of skim milk . . . but he was grinning.

In a few minutes we were back on the field and down on our knees patting the good earth. But that gesture of joy didn't take too long. Within seconds of our return there was a new law for acrobatic flights in open-cockpit airplanes: all cushions securely fastened to the airframe of the aircraft . . . inside, that is, and not in the rudder!

Static Chaser

(Continued from page 27)

the installation of at least a receiver for airport control by the tower because of increasing traffic congestion. Because our pilotowner friend's pleasure-type contact flying can be taken care of with a minimum of equipment installed, he decides on a portable battery-operated radio.

A point of prime importance in the use of radio is adequate range and sound level. Even if the portable radio features a built-in antenna, the plane owner will do well . . . in fact he'll do better . . . to have an antenna installed on his plane. Along with the installation of an antenna may come the need for extra work on the plane to assure clear radio reception. And here's where an expert radio serviceman can make or break the bank.

Some planes may require a lot of shielding; others may require very little. But before you decide to have the whole job done, talk it over with your serviceman. If he's as good as you think he is, he'll do the job step by step and not jump in and shield the whole system . . . bills run high that way, and very often there is no need for shielding an entire system.

A simple antenna installation, suitable for portable receiver reception, on most small planes may cost from six to 10 dollars and that includes labor. Installing the antenna is a job that a pilot can do for himself. But the pilot is wise who asks the advice of a serviceman first . . . and saves himself trouble and money later on.

The primary noise interference in aircraft radio stems from the engine's electrical system. In producing the current for the ignition, the magnetos act as high frequency generators and, to make matters worse, proceed to also put out uncontrolled wave radiations similar to the controlled wave lengths of a radio station transmitter. These mag radiations are picked up by the plane's antenna and in many cases, even when the antenna has been set up in a position far enough away from the mags to keep interference at a minimum, those radiations are picked up by wires in the ship's electrical system and carried along to a point near the antenna.

Another source of electrical noise in a radio is the generator itself. When electromagnetic disturbances are compounded by electrostatic sparking on the plane's structure, the pilot gets a headache from headset noises . . . and the radio serviceman gets a headache in trying to eliminate them.

Before putting any type of radio equipment in a plane, the aircraft owner should see to it that all bonding on the ship is checked for security. Remember, too, that all-metal airplanes require just as much bonding protection as the fabric-covered jobs. Bonding aids in dissipating static electricity charges evenly over the entire body of the plane. This keeps the charge low and evens all voltage potentials. The importance of secure and the proper types of bonding cannot be stressed too much to keep radio noise interference at an absolute minimum.

For those pilots who want to use portable receivers or small transmitters in their planes, there are prepared antenna kits available that cost up to three dollars. This

includes insulators, springs, and antenna wire with fittings. In some cases an antenna mast is not needed—this depends upon the type of plane and the amount of clearance from the fuselage required in mounting the wire. If an antenna mast is needed, most radio shops fabricate their own, and they don't cost very much.

Since the plane's ignition system causes most of the radio noise and the plane's electrical system helps carry the disturbing currents through the structure, it's fairly obvious that the focal point for trouble is in the plane's instrument panel, primarily around the ignition switch where all the troublesome elements come together. The antenna, therefore, should be placed as far back on the plane's structure as possible, without making it too short to give good reception. On the majority of aircraft, the single antenna wire for a portable can be anchored at the top of the vertical stabilizer or at the tip of one horizontal stabilizer and run forward to the top of the cabin.

If a plane has navigation lights, the wire through the fuselage to the tail light may closely parallel the antenna for a short distance. This is a condition that should be avoided if possible, because of the aforementioned system-wide pick-up. To eliminate this "noise-potential," the best thing to do is to either re-route the offending wire or raise the antenna higher above the plane. If the plane's fuselage is not sufficiently sway-backed to allow the antenna to clear it over its entire length, then a mast will be needed to give the height required.

If possible, the antenna lead-in should be placed at the rear of the cabin to give maximum distance from the electrical system. That "maximum distance" also suggests that the best position for the radio itself is as far back in the cabin as you can get it without its being in a position difficult for the pilot to reach. If the attaching points from the stabilizer to the rear of the cabin do not give a long-enough antenna length, then it may be necessary to run the lead-in from a forward position in the cabin to the interior of the plane. That's an evil that may not be avoided on some planes, but there is a fix for it. If the lead-in must be at the front top of the cabin, special shielding will be required to carry the wire to a plug box without its picking up the emanations from the ignition system.

Most radio mechanics prefer to avoid shielded lead-ins because they cut the range of the antenna, make trouble in anchoring points in insulated cabins and may require slicing the interior upholstery to place them in the correct positions. If a shielded leadin is necessary, however, it should be as short as possible. One service suggestion is that the lead-in connector to the radioplug receptacle should first be run through electrical "spaghetti," and then covered with braided shielding. The plastic covering acts as a protector to keep the shield from contact with the center wire. This center wire, by the way, should be as fine as possible without sacrificing strength. Naturally, the shielding must be wellgrounded. If it isn't, it cannot carry off the undesirable radiations it is meant to pick up.

That is the essence of the simple antenna system. The kits include the parts for the radio-plug receptacle. Some planes may not (Continued on page 56)

Chronograph Wrist Walch



10WEST MARKET PRICE \$7.25
Sweep Second Hand; Precision
Workmanship; Rugged Shockresistant case; Radium hands
and numerals; Leather strap, It
measures distance, speed of cars,
planes, horses and other moving
objects. It's a time keeper, stop
watch, telemeter, tachometer.
ONE YEAR WRITTEN GUARANTEE and full operating instructions enclosed with each
watch. SEND NO MONEY.
Mail your order today. Pay
yostman \$7.25 pius 10% Federal
tax, Total \$8.00 plus postage.
Or send cash (money order or
check) with your order and save
postage charge.

MARDO SALES CO. Desp; 3701
480 Lexington Ave. N. Y. \$12

HERE IS YOUR OPPORTUNITY IN AVIATION!

Take advantage of the excellent climate Arizona offers, and begin your training NOW. The GLOBE VOCATIONAL SCHOOL offers courses in MASTER AVIATION MECHANICS, Commercial Flight Training & Refresher A & E Mechanics. LIYE while you LEARN. THE GLOBE VOCATIONAL SCHOOL provides comfortable trailers for \$10 a month or offers quarters in the low cost Government Housing Project nearby.

VETERANS are eligible to receive training, books and tools as well as subsistence while enrolled. Write for our FREE catalogue.

Registrar, GLOBE VOCATIONAL SCHOOL Est. 1939 GLOBE, ARIZONA CAA Appd.

THE WORLD'S GREATEST VALUES
GENAM PROJECT From IMPORTER
THE WORLD'S GREATEST VALUES
GENAM PROJECTED BRAND NEW, DELUXE
LEATHER GASE INCLUEDE, CASH under Greater
Lifetime quarment. Use of our risk and opponent.
Lifetime quarment. Use of our risk and opponent.
Lifetime quarment. Use of our risk and opponent.
Lifetime values and control of prices? Free GauleaLifetime values. Use of our risk and opponent.
Lifetime values and control of prices. In the West
Lifetime values. Use of our risk and opponent.
Lifetime values. Use of our risk and our risk and our risk and our risk and opponent.
Lifetime values. Use of our risk and our ri

HOW 10 SELECT BINOCULARS" Add 20% Fed Tax. Postage Include USHNELL IMPORTERS Dept. ISW, 43 F. Green, Pasadena I, Calif.

IF YOU MOVE . . .

Send change of address to

SKYWAYS
HENRY PUBLISHING CO.

444 Madison Avenue

New York 22, N. Y.

at least 6 weeks before the date of the issue with which it is to take effect. Send old address with the new, if possible send your address label.

Copies will not be forwarded by the postal service unless you supply extra postage.

WATCH your ALTIMETER SETTING

AIREM COMPUTER

Send \$3.95 to

Compass Point Aviation Inc. 20 Morel Circle, Greenwood, Mass.

ENGINEERING DEGREE IN MONTHS

TECHNICAL COLLEGE

ENGINEERING, B.S. DEGREE IN 27 MONTHS. Aeronautical, Clienical, Civil, Electrical, Mechanical and Radio Engineering (inc. television), Drafting, 1-yr. Gov't approved for G.I.'s. Low rate. Earn board, Large industrial center, Students from 48 states, 18 countries, Demand for graduates, Enter March, June, Sept., Dec. Write for catalog, 220 E. Washington Bivd., Fort Wayne 2, Indiana.



DRIVE-IN-Air Force demonstrates straightaway loading of vehicles into the C-125

WENTY-THREE C-125 Raiders are currently being built by Northrop for the Air Force. Of the initial order, 10 will be used as assault transports and 13 for Arctic rescue. The Raider is a tri-motor transport considerably larger than most World War II transports, and is able to land in as little as 430 feet with an 8,000-

pound load. Under normal conditions, the airplane can take off in as little as 825 feet. The plane is also fitted with jet-assist units for short-field operations.

The Raider is powered by three 1200-hp Wright engines which give it a maximum speed of 210 mph, and a 1325-fpm rate of climb.

CARGO HOLD—Cargo compartment is 24 feet long. Tie-down fittings anchor the load



PICTURE CREDITS

Page 8—Glenn L. Martin; 10—Don Downie, Howard Levy; 14, 15—Acme, Int'l GE, Lockheed, Northrop, Ryan; 16, 17, 18— Piper by Gordon Vincent; 19—A. J. Nogard; 20, 21—Warner Bros.; 22, 23, 24— Downie; 25—Andrews; 26, 27—Howard Levy; 28, 29—Official Dept. of Defense; 30, 31—Howard Levy, Saab-Linkoping, Convair, Flight, Piasecki, Kidde, Levy. 32, 33, 34—CAA; 35—Witmer; 36, 37—CAA; 40, 41—Beech, Aeronca, E. I. du Pont de Nemours Co.; 42—CAP; 43—Convair; 44—Cessna; 46—Acme Telephoto; 47—Flight; 48—Hiller; 50—Avro Canada; 51—Downie; 52—Levy; 54—Wide World; 56—Northrop; 58—Helfer; 64—Piper

Static Chaser

(Continued from page 55)

require any further fixing for use with a portable receiver. While there will be interference noises in the radio, reception may be sufficiently loud and clear so that the installation is considered satisfactory as it is. Only test flights at varying distances from a control tower will tell. Test flights will also tell the pilot the best position in the cabin for the radio itself.

If there is too much noise in the radio the pilot must be prepared for more preventive work. The sore spot is probably in the magnetos, so the next step involves both the mag switch and each magneto ground wire. It is not necessary to install shielded ignition leads to the spark plugs unless the switch and ground wire operation does not do a complete enough job.

Because the mag ground wires meander alongside other electrical wiring on their way through the firewall to the ignition switch, they are responsible for distributing the radiations set up by the magnetos. Most magneto ground wire terminals at the mags already provide integral anchorage for shielding, but if not, they may be supplied by your service operator. The job at the other end of the switch is to provide an anchorage for ground shielding and also a shield for the other switch terminals if it is a master switch.

A homemade switch shield may be fabricated from a can which has a sleeve-type top (baking powder comes in this type can), but we don't recommend it. Cut holes in the can top for the other leads to the switch to pass through and solder to the top at proper holes ferrules for anchoring the ground wire shielding. Enough of the can body to give clearance over the ends of the switch connectors should be fastened firmly to the rear of the switch case by soldering. After the leads and the ground wires have been installed through the proper openings the ferruled top may then be tacked semipermanently into place with three or four dots of solder around its circumference and the ground wire shielding drawn up and fastened to the ferrules with the mating nuts. Essentially the same operation is required if the shield is fabricated from any suitable type of metal. If the work is not done by an A & E, it should be done under the supervision of one and should be rigidly checked to make sure the mag grounding is complete and the switch has not been affected in any way that might cause defective operation. The whole job can be eliminated, however, if the plane's owner wants to spend the money for a shielded switch and then merely connect shielded wire from the switch to the magnetos. Personally, we think it's money well spent. Certainly the results are more apt to be successful than with the homemade job.

After the ground-wire operation is completed the plane should be taken on another test hop and checked again for reception noise. If reception noise hasn't been sufficiently reduced, then from there on out the problem gets more complicated and more costly. A radio serviceman can tell the pilot whether his noise is still ignition instigated or due to another component in the electrical system.

(Continued on page 62)

Amazing Offer ACT AT ONCE!

SKYWAYS and YOUR WINGS, a complete text on flying by that ace authority Assen Jordanoff. . . . Sold in combination for the first time! SKYWAYS plus YOUR WINGS ... 294 pages and 550 graphic illustrations to show you how to fly if you're a novice, or how to fly better if you're already a licensed pilot!



PILOTS and STUDENT PILOTS

the world over read these TWO authorities on aviation

Chapt. II-SIMPLE AERODYNAMICS: The forces acting on a plane while flying; explanations of drag, thrust and lift; how flaps and slots affect airflow; rules and regulations for contact flying.

Chapt. III-PARACHUTE & ITS USE: How to wear a parachute and how to use it; how to land in water with a chute; how to pack it.

Chapt. IV—PRIMARY FLIGHT: A lesson in flying straight and level; how to make shallow turns and how to make steep turns.

Chapt. V-TAKE-OFF & LANDING: Your angle of climb; position of the stick during take-off; angle of glide for landing; position of stick during landing.

Chapt. VI-TURNS, CLIMBS & GLIDES: Right and left-hand turns; turns with wind and without wind; 5-turns and glides.

Chapt. VII—STALLS & SPINS: Normal stall; flying by "feel," spin to right, left; stalled horizontal flight; stalled glide and whip stall, recovery from stalls and spins.

Chapt. X—FIRST SOLO FLIGHT: Vertical turns and vertical "8's"; simulated forced landings; spot landings; slips, front and side; steep spirals, wing-overs, snap rolls and slow rolls and rolling "8's".

Chapt. XI-NAVIGATION: How to develop sense of direction; how to plot your course on a map . . . and fly it! Cross-country tips for day and night flying; how to crack up gracefully and with less chance of injury.

Chapt. XII-METEROLOGY: A study of the air; clouds and how to read them; wind conditions.

CHAPTERS XIII to XXVIII—Detailed how's of flying according to your instruments; how altitude and mixture affect the power from your engine; variable-pitch props; what icing conditions mean to flight; your airplane's radio and how to use it properly; instrument flying and instrument flying conditions; emergency maneuvers and downwind turns; military flying; gliding.



people subscribe to SKYWAYS than any other aviation magazine.

YOUR WINGS ... The most readable and helpful book ever published and soo mustrations offers a complete course in flight instruction. All the fine points of flying are explained and illustrated on the art of flying. Its 294 pages and 550 illustrations offers a complete to insure complete and easy understanding of Primary, instrument, and even Military flying.

Mail Coupon at Once

SKYWAYS, 444 Madison Avenue, New York 22, N. Y.

LIMITED NUMBER AT THESE AMAZING LOW PRICES!

\$2.50 • SKYWAYS for 3 years \$7.00 BOTH for \$7.50 \$2.00 • SKYWAYS for 2 years \$5.00 BOTH for \$6.00 \$1.50 • SKYWAYS for 1 year \$3.00 BOTH for \$4.50

for SKYWAYS.	for YOUR WINGS	andyrs. □ Renewal	subscription
Name			
Address			

_Zone____ State_

FEBRUARY 1950

Airport Extra

(Continued from page 36)

Chambers flying over there, so as to be able to advise what crops will grow best there and where they should be planted.

The prime spirit behind the CAA's backto-the-soil airport program is Phillips Moore who, for many years, was with the CAA's airport engineering service and who recently was appointed Assistant Airport Administrator for CAA.

A country boy from way back-he was born in a Georgia county "so far in the woods" that it didn't have a single railway running through it and, in fact, still doesn't -Mr. Moore used to get painful pangs whenever he visited airports and saw so much land lying around in idleness. It was all he could do to keep from scuffing up some of the land with his heels and surreptitiously depositing a few seeds.

Little by little, he found himself talking the airport managers into trying their hands at agriculture and now Mr. Moore, in charge of the Federal Government's million dollar program to improve the nation's airports, is openly and actively behind the idea of getting the airports to take to the tilling of the

land wherever possible.

Since, as everybody knows, the CAA's sole function is to better American aviation, you might wonder why it has become so all-fire concerned with squash, tomatoes, alfalfa, soybeans and the like. The answer is this: To a large extent, aviation progress is dependent on efficient, modern airports. For airports to maintain themselves at their best, a considerable amount af money is needed. A good way to get this money is to make use of all available idle land.

There are several ways that the airports are managing their agricultural activities. Santa Ana, Calif., turned over its land to a farmer with the understanding that it would receive 20 per cent of the amount realized from the barley crop. This proposition netted the airport \$8,681.51 in a year's time.

On the other hand, Koch Field, Flagstaff, Ariz., leased its available land for a year for the growing of pinto beans for a flat \$5,000.

A few airports are leasing their land to farmers not on a cash basis but with the stipulation that the farmers will assume the airports' landscaping responsibilities, seeing to it that the grass is kept at a proper height and that the turf remains in good condition. Since landscaping is an expensive item with airports, the idea results in a nice financial savings for the fields.

Some airports—like the one at Lawrence, Kans.—have become primarily an agriculture enterprise first. At Lawrence, the field is completely given over to clover and the planes just land in it, that's all. It doesn't hurt the planes at all, even if it isn't as formal as landing on paved runways. By utilizing every inch of its field for this purpose, the airport has been realizing \$5,000 a year from its clover.

Wherever possible, clover, alfalfa, hay, legumes and grasses are especially good airport crops since they can be grown right smack up to the runways without creating an aviation hazard. If a plane got off the runway and wound up in these grass fields, it wouldn't matter. On the other hand, stalked crops, like corn or cane, would definitely be a menace and so have to be grown further

back, away from general aeronautical activity. Some airports, having learned how nice it is to make every inch of terra firma come through with something, turn over its back recesses of territory to general crops and the area adjoining the runways to grass and turf seed production.

Properly penned off, of course, cattle is even being raised by some North Carolina

But no matter how pleasant the prospect of making this extra money from crops may be, safety and general aeronautical efficiency are still the principal purposes of airports and that is why some airports can't adopt an agricultural sideline. In some instances, the contour of the field is such that crops would interfere with proper drainage; in other instances, particularly in so-called dust bowl areas, to disturb the ground in crop harvesting would invite almost certain soil erosion.

But most airports can grow some kind of a crop that will augment revenue. All any airport, private or municipal, interested in



CROPS such as hay, alfalfa, etc., can be grown right smack up to the airport runways

turning to agriculture has to do is get in touch with the CAA and it will come arunnin', hoe in hand.

So enthusiastically is the let's-be-farmers idea sweeping the nation's airports that sometimes the CAA has to hurriedly throw up a restraining hand.

This happened recently out Arkansas way. In the CAA office in Washington, an official was going through a routine batch of airport reports when he suddenly found himself frowning over one.

"Rice," ' he muttered, "They're planning to grow rice at this airport. Somehow-I don't know why-it just doesn't hit me right."

Then he almost leaped out of his chair in

"I know why," he exclaimed. "In the movies you see of the Chinese rice fieldsthey're always cultivated under water."

A CAA man was hurriedly dispatched to the Arkansas airport. Sure enough, the airport manager was planning to inundate the field.

He was talked out of it in time.



Use Altimeter Setting

(Continued from page 53)

computer, the pilot sets the distance between stations (190 miles) opposite the pressure difference (.10" in this case). He sets the latitude Index opposite 42°. He reads the drift correction angle of 71/2° opposite his airspeed of 160 mph. Note that the drift correction angle in degrees is just 75 per cent of the pressure difference in hundredths of an inch. The important and very satisfying thing here is that on that particular route, the drift correction will always bear the 75 per cent relationship to the pressure difference. After working out this first problem on the computer, which is simple enough at worst, on subsequent flights over the same route, he can figure the drift correction angle in his head, provided of course he is cruising at the same speed. On his next flight, for example, the pressure difference might be .08". Taking a figure 75 per cent of that and expressing it in degrees he has a DCA of 6°. (If flying toward a lower pressure, the DCA is to the left, of course, and to the right if flying toward the higher pressure.) Thus, for any given route, at any given airspeed, the relationship of the DCA to the pressure difference is constant.

The winds-aloft reports are currently given in knots instead of miles per hour. Many pilots may still prefer to use miles per hour for their personal flying since airspeed indicators, are, for the most part, calibrated in miles per hour; protractors are usually calibrated in miles. Although either unit can be used for pressure-difference navigation, miles per hour is currently used.

Like all systems of navigation, pressuredifference flying is not perfect. It is no cureall. It is possible, however, to tell in advance pretty much when it will not be accurate. To know when a system cannot be trusted is actually quite a point in its favor. Furthermore, when substantial errors do exist, it is usually possible to interpret these errors so as to give the pilot valuable meteorological information. At times, the weather information the pilot can get in this way may far surpass the value of a correct DCA; whereas; when the regular winds-aloft information is erroneous, the pilot is left with nothing but a bad drift estimate.

To get the benefits of pressure-difference flying it does have to be used within its limitations. In most sections of the country for the majoriy of pilots, these limitations are not too restricting. For the average private pilot, they may not in practice be limitations at all.

Essentially the system is for the lowaltitude flyer. The maximm altitude is about 5,000 feet above the average terrain. The ideal altitudes are between 1,500 feet and 3.000 feet.

On long flights (over 400 miles) a single drift-correction estimate should not be made for the entire distance. A separate drift-correction estimate should be made for each 400-mile (or less) leg of the flight (ideally. as near 200 miles as possible). That is, altimeter settings should be taken for stations within this range.

For flights of less than 60 miles it is necessary to use some station lying along an extended course line that does fall within the mileage restriction above. Preferably not over 100 or 150 miles away.

Pressure-difference navigation will work at all latitudes except in the equatorial regions. Latitudes higher than 20° or 25° latitude should prove satisfactory. This permits its use anywhere in the United States or points north.

If you fly from airports not issuing altimeter settings, you have two alternatives. First, you may use the altimeter settings of two stations in your general area which do issue settings, and which lie generally parallel to your course; or secondly, if your altimeter has previously proved accurate when cross checked with the official altimeter settings at other airports, you may set your altimeter to field altitude and use that setting, together with your destination airport, or some airport along an extended course line.

In good weather error may be introduced as a result of local conditions not governed by the terminal pressure differences. For example, in coastal regions, the best known local variants of this sort is the sea breeze. Local variants however, normally occur only under CAVU conditions when an alert pilot can catch such errors by visual checking.

In bad weather, errors are even less likely to arise. They are apt to occur only when conditions are changing very rapidly. A very rapidly deepening low will result in a drift calculation being too great; a rapidly filling low, in too small a drift correction.

During a two-year test period, we have found good results during good weatherabout the same as using the regular windsaloft method. During bad weather, pressuredifference flying improves in efficiency and becomes far superior to the regular windsaloft method.

Frequently we have found that the true DCA lay between the winds-aloft indication and the pressure-difference indication. Two systems therefore, would seem better than

There is something in all this for the beginner pilot, too. He says he doesn't use dead reckoning navigational methods. If the weather isn't good enough for him to see everything he needs to see, he doesn't fly. And when he does fly he plans route so that he can have plenty of good check points. More power to him! It's the cautious, safetyminded pilots that keep aviation's record clean. But there is a lot to be said for building for the future, a lot to be said for getting a practical, working acquaintance with the general nature of the air, or pressure areas, that you are dealing with every minute of your airborne life, and a lot to be said, too, for having a little extra knowledge that may come to your aid on those unexpected occasions when the good weather and the check points don't work out exactly as they were supposed to.

Many pilots, for instance, will get out their sectional map and study it carefully so they will be acquainted with the contours of the earth on their course. They note any particularly high elevations and any pronounced declivities. And that's importantbut after all they are going to fly over the earth and through the air. That's why we think it is a good idea to get yourself oriented with respect to the "contours", so to speak, of the medium you are really working in-the air. Most of us don't have time to go into all the meteorological details on every flight, but even the least experienced private pilot can feel a little less like a



Lavish new facilities...no expense

spared by new ownership and management to expand and perfect already superb provisions for luxurious leisure.

Daniel C. Taylor, Pres. James J. Farrell Managing Director Summers: The Monmouth Spring Lake, N. J.



EACH, FLORIDA

New Full-Color Brochure on Request

NEW THIS YEAR: A GREAT NEW CABANA-SUN COLONY ★ OLYMPIC SIZE SALT WATER POOL ★ DELUXE CABANAS AND SUN DECK ★ YACHT BASIN ★ TENNIS, BADMINTON, SHUFFLEBOARD COURTS ★ PUTTING GREEN ★ OUTDOOR DANCE PATIO * AIR CONDITIONED TROPICAL AND WEST INDIA ROOMS FOR DINING, DANCING, COCKTAILS.

Now open all year. Modified American Plan Dec. 15 - Apr. 16. European Plan in Summer. Catholic and Protestant Churches Nearby.



Century's 4-Way GASOLINE SELECTOR VALVE #1702 Disassembled

Scientific engineering combined with precision manufacturing assure long life with simplicity of assembly and efficient operation of CENTURY AIRCRAFT SUB-ASSEMBLIES, HY-DRAULIC CONTROLS and FUEL SELECTOR

We Invite Inquiries

CENTURY AIRCRAFT CO., 5607 West Century Blvd., Los Angeles 45, Cal.

stranger in the sky if he knows that there is a low-pressure area off to the north of him and that he can expect a drift to the right, perhaps, of 6°. He takes off and, sure enough the drift begins to set in. But instead of feeling that it is just another incomprehensible problem that besets him, the thing begins to have meaning and significance. If the drift decreases appreciably or

increases markedly, it brings a message to him that the non-pressure-difference flyer misses entirely. And the day may come when the fun he's had experimenting with pressure-difference flying in good weather, will pay off by giving him the right answer to the question we all face sooner or lateris it better to go on, or should I turn back? +++

* CLASSIFIED ADVERTISING

SKYWAYS' CLASSIFIED ADVERTISING RATES ARE 8c PER WORD-FIRST 15 WORDS (MINIMUM SIZE) \$1.00

USED PLANES FOR SALE

AERONCA

AERONCA 18 late Chiefs and Supers available from \$850. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

REECH

TWINS: 26 available. All models. 1946, D-18-CT, #811838, has 2 hours since major overhaul. 525 HP. Continental engines with 200 total hours. Hydromatic propellers. Air line Equipment and interior. Beautiful condition. \$25,000. Apply POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City; or, 505 North Ervay, Dallas, Texas.

BONANZAS: 32 available from \$5500. Late 1948 model A-35, #724BS, has 363 hours. August license. 2 radios. ADF. Top condition. \$7950. Lage 1949, #8629AS, has 240 hours. Gyros, Flares. \$9975. Excellent. Inquire, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City; or, 505 North Ervay, Dallas, Texas.

BONANZAS. 15 available from \$5600. 2757V, 1947 Model 35 has 162 engine hours, 262 airframe hours. Extras. Excellent. \$6550. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

BELLANCA

CRUISAIRS: 15 available from \$2450. Late 1947, #75426S, has 350 total hours. Primary blind panel. Aeromatic. August license. All bulletins. New looking. \$3000. Make offer. Inquire, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City; or, 505 North Ervay, Dallas, Texas.

CALLAIR

CALLAIR. 3 available from \$1,250. Ask for details. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

CESSNA

195'S: 7 available. 1947, #4436NS, has one gyro. 2 radios, ADF. August license. All bulletins. Corporation owned. Clean. \$8990. Late 1948, #3582VS, has 365 hours. Gyros. 2 radios. ADF. August license. Outstanding. \$10,300. Offers wanted. Apply, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City; or, 505 North Ervay, Dallas, Texas.

CESSNA 120's and 140's. 93 available from \$1,000. No. 76604, 1946 Model 140, 109 total hours. GE radio, metal propeller, T&B, RofC, heater, landing light. Never damaged. \$1,650. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

CESSNA 170. 6 available. Offers wanted, 1948 model, 135 hours, extras, \$3,900. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

CESSNA 195. 4 available. 1947 model, 445 hours, VHF, ADF, etc., \$8990. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

CRUISAIRS

cruisairs. 8 available from \$3,000. 1947 model, 243 hours, modified to 1949. Has complete equipment. \$3,650. Offers considered. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

ALL CLASSIFIED ADVERTISING

accepted with the understanding that it will be placed in the first issue closing after receipt of order. Classified forms close first of second month preceding date of issue.

All Classified Advertising Prepaid

CULVER

CULVER "V." 15 available. \$1,000 up. #89262 has 126 total hours, new sensenich two position propeller. Excellent. \$1050. LCA's and LFA's also. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

ERCOUPE

ERCOUPES: 87 available from \$850. 1947 model, 85 hp., 130 hours, extras, bulletinized. One owner. \$1,100. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

FUNK

FUNK. 9 available from \$1,000. 1946 model, 295 hours, 90 since top, extras, \$1,200. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

GRUMMAN

#6005E AMPHIBIANS: 8 available from \$30,000. #60274S flown 70 hours since completely rebuilt, corrosion proofed, and painted November 1948. New engines, interior, ADF, automatic pilot, etc. Bar. Lavatory. Relicensed. Perfect. Beautiful. \$35,000. Inquire, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City; or, 505 North Ervay Street, Dallas, Texas.

WIDGEON AMPHIBIANS: 16 available from \$7625. 1947. G-444A, #87667S, has 233 total hours. Curtiss metal propellers. Special radio, Loop. Gyros, Relicensed. Grumman maintained. Exceptional, \$16,500. Offers wanted. Exclusive listing. Apply, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City; or, 505 North Ervay, Dallas, Texas.

HOWARD

HOWARD. DGA-15's and NH's. 9 available from \$1,750. Owners want offers. 1945 NH, 365 total engine hours, 170 since overhaul, complete equipment, excellent, \$2,300. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

LUSCOMBE

LUSCOMBES 54 available. 1947 deluxe, 125 private hours, extras, \$1,500. Ask for descriptions. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

1947 LUSCOMBE 85 Silvair DeLuxe. Complete with primary blind group wheel pants, flares, 2-way radio, station generator \$1800. R. W. Baker, 1105 N. Jackson, Casper, Wyoming.

LATE 1946 LUSCOMBE 65C: 145 hours. Generator, battery, lights. Stall warning, Muffler. Always hangared \$1095. Bernard Matravers, Oconto Falls, Wisconsin.

NAVION

NAVIONS: 43 available. 1948, #1699KS, has only 50 hours total. Delivered February 1949. Primary blind instruments. Directional indicator. ADF. Aeromatic. Always hangared. Never damaged. New condition. \$7500. Bargain. Inquire, POWERS & GEORGE, Aircraft brokers, 475 Fifth Avenue, New York City; or, 505 North Ervay, Dallas, Texas.

NAVIONS. 15 available from \$4750. 1947 model with new 1949 engine, 205 hp. \$6,500. Immaculate. Ask for descriptions. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

PIPER

PIPER. 55 available, all models, two, three, four place. Name your model, get a bargain for cash. Ask Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

REPUBLIC

SEABEES: 49 available. #6342KS, Serial \$444 has majored engine. Steerable tailwheel. 2 seat chutes. Electric hull pump. May license. All bulletins. \$1350. #7817K, Serial \$970, has only 22 total hours. September license. All bulletins. Hangared. Never damaged. New condition. Exceptional. \$2775. Apply POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City; or 505 North Ervay, Dallas, Texas.

SEABEE. 24 available from \$1.750. Owners want offers. #6026K has radio, reversible propeller, 196 total hours, no corrosion. \$2,000 asked. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

STINSON

\$\frac{\text{stinson 150's & 165's:}}{\text{ Large selection from \$1700. 1948 Station Wagon 165, #789CS, has 298 hours. September license. All bulletins. Always hangared. Never damaged. Clean. \$3100. Make offer. Inquire, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City; or 505 North Ervay, Dallas Texas.

STINSON. 67 Voyagers and Station Wagons, \$1,800 up. 1948 Station Wagon 165, 295 total, cquipped, relicensed, excellent. Asking \$3,100, offers considered. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

SWIFT

SWIFT 125'S: 19 available from \$1800. Late 1946 Globe, #3896KS, has 163 hours. Aluminum hatch, Primary blind. Gyro. Aeromatic. Radio. Looks new. \$2000. Temco 1948, #78771S, has 190 hours. Primary blind. Aeromatic. Radio. Perfect. Try offer \$2750. Apply, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City; or 505 North Ervay, Dallas, Texas.

SWIFT. 125's and 85's. 26 available. 85's with low hours from \$875. Excellent 125's from \$1.900. Which model? Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

USED PLANES WANTED

PROGRESSIVE aircraft brokerage will sell your airplane. No charge for listing. Write for details and describe your airplane. Madden Aircraft Brokerage, 211 North Longview, Dayton 3, Ohio.

CLASSIFIED ADVERTISING

POWERS & GEORGE, Aircraft Brokers, of 475 Fifth Avenue, New York City; and, 505 North Ervay, Dallas, Texas, have purchasers for all types of aircraft. No charge for list-ing your ship for sale. Write for details, describing your airplane.

FLYERS! Send today for the lastest issue of "Wind-Socky". The Midwest's leading New and Used Aircraft Publication. Bargains! Pictures! And the latest Aviation News. Published monthly. Yearly subscription \$2.00. 25¢ per copy. Box 1060, Des Moines, Lova.

AVIATION EQUIPMENT & SUPPLIES

CIVIL AIR PATROL UNIFORM INSIGNIA. C.A.P. or C.A.P.C. shoulder patch 18¢ each. C.A.P. or C.A.P.C. overseas hat patch 10¢ each. or C.A.P.C. snoulder patch 18¢ each. C.A.P. or C.A.P.C. overseas hat patch 10¢ each. C.A.P. PILOT or OBSERVER wing \$1.50 each. C.A.P. cut-out letters 60¢ each. Wing & Propeller device 60¢ each. C.A.P.C. cut-out letters 70¢ each. C.A.P. Officer enameled metal cap device \$2.00 each. C.A.P. Senior Member cap device \$1.00 each. C.A.P. BUTTON SET, complete \$2.00 set. C.A.P. miniature wing for civilian lapel 75; each. C.A.P. identification bracelet. sterling silver, guarture wing for civilian lapel 75; each. C.A.P. identification bracelet, sterling silver, guaranteed to fit men and women perfectly with miniature C.A.P. wing on front and room on back for name, address, etc. \$4.95 each. All insignia guaranteed new regulation or money back. FREE complete catalogue with order. Mail payment with order, and we pay shipping or we will ship C.O.D. plus postage. FEDERAL SUPPLY COMPANY, 135 Henry Street, Dept. SK, New York 2, New York.

NAVIGATION INSTRUMENTS: Beautiful new and reconditioned precision instruments. Brand new Link Aircraft Sextants with case \$37.50; Fairchild reconditioned \$12.50; averaging type. \$17.50; Bausch & Lomb Sextants, excellent condition, \$49.75; Brunning Drafting Machines \$55.00; Navy Stadimeters \$24.00; Surveyors Levels \$175.00; Seth Thomas Classroom elect Clocks \$14.35; 6-inch (new) Pioneer Magnetic Compass \$12.95; Pioneer panel Compass (new) \$17.50; Weems Mark II Plotter \$2.00; Dalton E-6B Computer \$10.00; A-2 Deluxe Computer with Case \$3.00; American Airlines Computer \$5.00; F-8 Aerial Cameras (new) \$185.00; Astro Compasses (new) \$12.50; (Free catalogue) Pan American Navigation Service, 12021-22 Ventura Blvd. N. Hollywood, California. NAVIGATION INSTRUMENTS: Beautiful new

NEW B-15-A TYPE FLIGHT JACKETS. Green O.D. military twill. Alpaca lined—MOUTON FUR COLLAR with storm flap-snaps on two slash pockets. Knit cuffs & waistband. AAF patch on shoulder—pencil pocket on sleeve. Sizes 36 to 48. Only \$11.95. B-15 type flight jackets, sizes 36 to 46. Only \$9.95. K-1 Summer Flying Suits only \$9.95. Sunglasses AAF Type only \$1.45. Special 20% discount on lots of any six pieces or more. MONEY BACK GUARANTEE. FREE CATALOGUE UPON REQUEST. R.A.F. Manufacturing Co., 7009 N. Glenwood Ave. Dept. SM-1, Chicago, Ill. Postage prepaid if payment accompanies order.

KHAKI UNIFORMS. Sanforized shirts with shoulder straps \$4.95 each. Sanforized trousers with zipper front \$4.95 each. Web belt, solid brass buckle 50; each. Khaki ties \$1.00 each. Khaki overseas hats, Officers or Enlisted man 95¢ each. Khaki service caps with leather visors all sizes \$7.95 each. FREE complete catalogue with order. Mail payment with order and we pay shipping or we will ship C.O.D. plus postage. FED-ERAL SUPPLY COMPANY, 135 Henry Street, Dept. H, New York 2, New York.

GENUINE NAVY INTERMEDIATE FLIGHT JACKETS.

GENUINE NAVY INTERMEDIATE FLIGHT JACKETS. New finest dark brown GOATSKIN leather. Bi-swing back, Rayon Lined 150 count, Large Mouton Fur Collar. Zippered front. Two patch pockets. One insidesnap pocket Elastic knit waistband and wristlets. SIZES 34 to 46. Only \$29.95. Postage PREPAID IF PAYMENT ACCOMPANIES ORDER. MONEY BACK GUARANTEE. Write for Dealers' Discount. R.A.F. Manufacturing Co. 7009 No. Glenwood Ave. Dept. SM-1, Chicago, Ill. BUY DIRECT AND SAVE.

NEW A-2 AAF REGULATION TYPE FLIGHT JACKETS. Finest Front Quarter Horsehide. Same as issue with Rayon Lining. Sizes 34 to Same as issue with Rayon Lining. Sizes 34 to 46 only \$17.75—larger sizes add \$1.00. With Mouton Fur Collar \$18.75. A-2 Flight Jackets with new two way pockets, all sizes, only \$18.75. With MOUTON FUR COLLAR \$19.75. Special 20% discount on lots of any six jackets or more. MONEY BACK GUARANTEE. WRITE FOR FREE PRICE LIST & CATALOGUE, R.A.F. Manufacturing Co. 7009 N. Glenwoood Ave., Dept. SM-1, Chicago, Illinois. Postage prepaid if payment accompanies order.

AIR FORCE NEW REGULATION UNIFORM IN-AIR FORCE NEW REGULATION UNIFORM INSIGNIA. Regulation sterling silver Pilot wings, 2-inch size, \$2.00 each. Blue web belt with silver buckle 75¢ each. Blue tie \$1.00 each. Blue service cap, leather visor, all sizes \$8.95 each. FREE complete catalogue with order. Mail payment with order and we pay shipping or we will ship C.O.D. plus postage. FEDERAL SUPPLY COMPANY, 135 Henry Street, Dept. K, New York 2, New York.

GENUINE NAVY INTERMEDIATE FLIGHT GENUINE NAVY INTERMEDIATE FLIGHT JACKETS, new dark brown goatskin leather, mouton fur collar, comfortable bi-swing back, celanese lined, zippered, elastic-knit waistband and cuffs, sizes 34 to 44 at \$35.00 each. Flying Equipment Company 1641-5 W. Wolfram St., Dept. S, Chicago 13, Illinois.

HELMETS: ANH-15, new, tan cloth with sponge rubber ear cups, \$1.00. A-11 AAF Kidskin leather helmet, sponge rubber ear cups, \$3.45. Sun-Dodger Flying Cap, khaki twill, long visor, \$1.15. B2 Pilots cap, dark brown leather sheepskin lined, long visor, ear laps, \$3.75; Flying Equipment Co., 1641-5 W. Wolfram St., Dept. S, Chicago 13, Illinois.

NEW FAHLIN PROPELLERS for all airplanes 50 to 225 hp. \$29.95. Ozark Airways, Marshall Missouri.

AVIATION EQUIPMENT & SUPPLIES

HALLICRAFTER Skyfone Transceiver, Model CA-4 12-volt, brand new, weighs 7 lb. 14 oz. A bargain at \$50.00. each. Antenna mast and loading coil \$4.50. Headset \$3.50, Microphones \$2.75 and \$6.75 each. Send for free list. Flying Equipment Company, 1641-5 W. Wolfram St., Dept. S, Chicago 13, Ulipair

BATTERIES & TIRES: New, for all types aircraft. Low prices. Send for free list. Flying Equipment Company 1641-5 W. Wolfram St., Dept. S, Chicago 13, Illinois.

BOOKS

GUARANTEED: Ross Guaranteed Question-naires are available for all C.A.A. ratings. They carry a full money back guarantee if you fail to pass your exams. Ross Question-naires have been used by thousands of Pilots, Mechanics and Instructors with success. The

frequent revisions insure your obtaining the very latest material. With a Ross Guaranteed Questionnaire you save time, Effort, and Money. Order direct or from your nearest Dealer. Engine Mechanic \$3.00; Aircraft Mechanic \$3.00; Both for \$5.00; Commercial Pilot \$4.00; Flight Instructor \$4.00; Instrument Rating \$4.00; Meteorology Instructor \$2.50; Navigation Instructor \$2.50; Aircraft Instructor \$2.50; Engine Instructor \$2.50; C.A.R. Instructor \$2.50; Fundamentals of Instruction \$1.00; As a special offer the complete set of the above Questionnaires are priced at only \$15.00; Ross Guaranteed Questionnaires are the only books available Questionnaires are the only books available that include the same Navigation and/or Weather maps that are used by C.A.A. on their exams. Free folder on request. Orders sent Postpaid or C.O.D. Ross Aero Publishers, Dept. 1-S, Administration Building, Commercial Airport, Tulsa, Oklahoma.

STUDENTS, MECHANICS, FLIGHT ENGINEERS: AMQ (AERO Mechanics' Questionnaire) by Ralph Rice is again available in a greatly enlarged and completely revised edition. 2300 multi choice questions with answers and explanatory notes covering all phases of Air-craft and Engine Mechanics including Power craft and Engine Mechanics including Power Plants, Carburetion, Lubrication, Propellers, Electricity, Woodwork, Dope and Fabric, Sheet Metal, Welding Rigging, (including solved weight and balance problems), Hydraulics and Civil Air Regulations based on current issues, \$3.98 postpaid, or C.O.D. plus postage address: Paxon Publications, Box 479, Lawrence, Kansas.

YOU NEED ONLY TO MAKE ONE TRIP to the Now NEED ONLY TO MAKE ONE TRIP to the Inspector's office to pass the Commercial Navigation Written if you study with "Simplified Navigation Workbook," All problems fully explained and illustrated. Complete with sample multiple choice questions to be solved from World Air Chart included free. Save time and money! Only \$2.00 cash or C.O.D. plus charges. Money back guarantee. Hangar Flying, Dept. 2M2, 112 E. Grove St., Bloomington, Ill. Clip this.

WHY TAKE A CHANCE! Pass the commercial Written the first time! You can test yourself with "Commercial Pilot Rating" before taking time-off to write the test. Navigation, including a free World Air Chart; Meteorology, including a station model and sequence reports; Aircraft and Engine maintenance and operation; and Civil Air Regulations are fully covered. \$2.00 cash or C.O.D. plus charges. Money back guarantee. Hangar Flying, Dept. 2D2, 112 E. Grove, Bloomington, Ill. Clip this. WHY TAKE A CHANCE! Pass the commercial

WING TIPS FOR CROSS-COUNTRY FLYING. The new book, in non-technical languages, explaining the little things that make crossexplaining the little things that make cross-country navigation easy and safe, such as checking landmarks, weather, and special problems encountered in various parts of the country. Written by a pilot for pilots. \$1.00 cash or C.O.D. plus charges. Money back guarantee. Hangar Flying, Dept. 2N2, 112 E. Grove, Bloomington, Ill. Clip this.

FREE! How to fly cross-country safely—how to land at airports—told in free booklet, "Happy Landings," sent to Pilots and Students. Hangar Flying, Dept. 2J2, 112 E. Grove, Bloomington, Ill. Clip this.

WHAT EVERY PILOT SHOULD KNOW. Big book of "Questions for Pilots," including correct answers. Have fun in Hangar Flying sessions quizzing yourself and friends. 25¢ cash, no stamps, or C.O.D. Hangar Flying, Dept. 2H2, 112 E. Grove, Bloomington, Ill. Clip

(Continued on page 62)

CLASSIFIED ADVERTISING

(Continued from page 61)

BUSINESS OPPORTUNITIES

PROFITABLE OPPORTUNITIES in small aviation business. Confidential survey describes 47 opportunities to start your own business in aviation: 21 ways to make money with a light plane! 16 on-the-ground "shoestring" opportunities (capital \$100 up)! 10 opportunities requiring moderate capital (\$1,000 up)! Includes spare-time and mail-order businesses. \$2.00. Christopher Publications, Dept. DP-12, Holtsville, N. Y.

WOULD YOU PAY 3% first \$350 made? Free book '505 Odd, Successful Enterprises Free. Work home. Expect something odd. PA-CIFIC, 6-Y, Oceanside, California.

HELP WANTED

"142,000 AVIATION JOBS"—official CAA forecast! Now, for immediate opportunities, we will rush you: Confidential reports covering over 75 aviation job-openings (domestic, foreign) listed by employment agencies; manufacturers, airlines. Salaries! Qualifications! Where to apply! \$1.25. Lists of companies to contact for high-paying jobs: 159 Airlines (including Alaskan, South American, Foreign, Non-scheduled); 64 aircraft and accessory manufacturers. \$1.25. 6,000 word survey of Airline Employment, revealing many little-known opportunities for men, women, skilled, unskilled. \$1.25. Limited time offer—all 3 for \$2.00. Includes Free! Foreign Opportunities Report. Christopher Publications, Dept. DG-12, Holtsville, N. Y.

crop dusting jobs pay big money. Confidential Report covering forty states tells you where to apply if you are an experienced pilot or want to learn this interesting and profitable profession. Send only \$2.00 for "Report CD". Includes free registration and advisory service Satisfaction Guaranteed. RESEARCH SERVICES, Box 426-1720 Market Street, St. Louis 3, Missouri.

INTERESTED IN LATIN AMERICAN & FOREIGN EMPLOYMENT??? \$1.00 brings copyrighted foreign Service Directory listing firms interested in Oil, Construction, Mining, Aviation, Exports & Imports. How-When-Where to apply. Hot list of companies hiring. Global Reports, Dept. SS, P.O. Box 883, Hollywood 28, California.

"ALASKA—The Last Frontier" offers unlimited opportunities. \$1.00 brings official government map & copyrighted report with Fish & Game rules, listing Fishing-Construction-Mining-Aviation companies. Homestead and Alaskan Highway information. ALASKA OPPORTUNISTS, Dept. SS, P.O. Box 883, Hollywood 28, California.

AIR FORCE EXPANSION is creating thousands of Big Paying Factory jobs all over the country for skilled and unskilled men and women. For \$2.00 we'll rush latest confidential report on who and where to contact for the best jobs. Free registration and advisory service included. RESEARCH SERVICES Department M, Box 426 1720 Market Street, St. Louis 3, Missouri.

INSTRUCTION

INFORMATION FOR PILOTS. An easy to read book for all Pilots. Covers Aircraft, Theory of Flight, Engines, Meteorology, Navigation, Radio Procedures and complete Section of Questions and Answers. A Complete Pilot's Manual \$3.75. CAR 20.43-69 (Civil Air Regulations amended to the date of mailing) with Questions and Answers for \$1.00. Both books for \$4.50. C.O.D. or Postpaid. Order today. Let these books help you as they have helped others. Written by Pilots for Pilots. Marken Aviation Training Service, Box 151S, Rochester, Minn.

VETERANS: Be a pilot. Tuition paid under the G.I. Bill. Private, Commercial, Flight Instructor, Instrument, and Multi-engine courses. Opportunities for part-time employment while studying. Ideal flying conditions. Write for information. Gottschalk School of Aeronautics, Adrian, Michigan.

YOU CAN DESIGN YOUR OWN DREAM AIR-PLANE. New simplified Home Study Course. Free details. AIRPLANE DESIGN COR-PORATION, Dept. S., Box 972, Seattle 11, Washington.

BUILD, FLY-BULLET RACEPLANE. Fast, Light, Low-winged Monoplane. Blueprints \$2.00. Corbcraft, 80 Mexwell, Rochester 11, New York.

INSTRUMENTS

INSTRUMENTS — Kollsman Sensitive Altimeters \$14.95; Pioneer Rate of Climbs \$9.95; Turn & Banks \$9.95; Cylinder Head Temperatures \$8.95; Pioneer Compasses \$6.95; 0-300 Airspeeds \$6.95; Directional Gyros \$19.95; Artificial Horizons \$19.95; Outside Air Temperatures \$4.95; Tachometers \$5.95; Suction Gauges \$3.95; Primers \$4.95; Ammeters \$3.95; Voltmeters \$3.95; Payment with order. Prices subject to change without notice. Gaare Supply, Box 1377, Vernon, Texas.

MISCELLANEOUS

ATTENTION, AIR MINDED MEN. Beautiful new homes right by the Croton Air Park, in lovely country setting, just a few moments walk from your private Hangar. In bad weather only 3 miles from Harmon Station; 49 minutes from Grand Central Station by train, best commuting Station on the line. These homes with 5 rooms and bath on ground floor have expansion atties are real bargains. For more information Call Nelson Croton-on-Hudson. Telephone 4357.

SELF-CONSCIOUS? SHY? NERVOUS? Send for Dericott's latest course. Has helped thousands find greater enjoyment and satisfaction in life. It is guaranteed to help you! Only \$1.00. Share, Dept. 7, 2644 Huntington, Mpls., Minn.

YOUR NAME AND WINGS in 23-Karat gold on leather patch, Military, or Civilian, \$1.00 each. 3 for \$2.00. Names only 2 for \$1.00. Clubs, Schools, Airlines, your own wings or design. Julie's Leathercraft, Lone Tree, Lowa

YOUR LEATHER JACKET renovated by our craftsmen expertly, reasonably. Request Free descriptive circular. Berlew Mfg. Co., Dept. 33, Freeport, New York.

BOYHOOD DAYS—9" X 12" hand painted \$1.00 postpaid. Miles Johnson, 2025 East 88th Street, Cleveland, 6, Ohio.

LEATHER INSIGNIAS tooled and painted, five inch diameter \$3.50. Discount on 12 or more. Send sketch or design. Satisfaction guaranteed. No C.O.D.'s. Julie's Leathercraft, Lone Tree, Iowa.

BELTS . . . Hand tooled in Mexico, Custom scrowl design, any color \$1.98 valued at \$5.00 in the states. Hobbycraft Center, Las Cruces, New Mexico.

BOOTS . . . WESTERN STYLE. Handmade in Mexico \$19.95; any design or color value \$35.00 in the states. Hobbycraft Center, Las Cruces, New Mexico.

BUILD YOUR OWN 'SPIN-PROOF' AIRPLANE. The newest "Flying-Flea" Blueprints. \$4.50. William Venema, 142 Haledor Avenue, Paterson, New Jersey.

Static Chaser

(Continued from page 56)

Generator noise may be present due to a dirty commutator, unshielded leads or to the need for a condenser or filter in the system, possibly at the voltage regulator, even though the radio is battery-powered. A wire from some portion of the electrical system, either behind the switch panel or near the engine, or an engine instrument lead, may be causing the disturbance. If it is impossible to re-route parallel wiring that may be sympathetically picking up electromagnetic radiations either in front of or behind the firewall, then the remainder of the engine ignition system may have to be shielded.

Most postwar private plane mags come with the basic equipment to convert to a shielded system—modified magneto backplate—or the work may be done with a conversion kit made up by the manufacturer at an average cost of less than three dollars per mag, depending on the type. Hightension shielded wiring for any of the standard personal aircraft engines should not cost more than about \$15.00 per cyclinder on an average, along with the necessary attaching parts, figuring that the pairs of leads will have different lengths depending on the cylinder location.

If, despite all your troubles in outfitting your basic plane, you are one of the few pilots who still get cat fights along with tower instructions, then you are in a fixbut one that isn't too unusual. The guy with hundreds of dollars worth of expensive equipment had to go through the same process of plane-proofing that you did, although it may have been more intricate. And even if a plane owner has "noise free' VHF, he may still have his noise troubles. The solution to your problem is the same as his-get a good radio mechanic to worry about it. The trouble is probably in the ignition system someplace and even the shielding won't always eliminate it without a few extra experiments. Fortunately, this doesn't occur too many times and part-way along the installation road your noise problem may be solved without having to resort to the complete treatment, mechanically and financially. In many cases, the installation of static wicks will go a long way toward solving the noise problem. Dayton Aircraft Products in Dayton, Ohio, make a static wick that's proved highly successful. Before you become involved with a lot of radio mechanic expense, it might be worthwhile to investigate the Dayton static wick dischargers.

In closing, a few words to the wise may save a costly headache. Don't let anyone tear your equipment or plane apart, or replace your equipment, without a reasonable explanation for the job. While it's tough to control the labor cost, there's no reason to pay for unnecessary maintenance or parts. Any reputable radio mechanic will be glad to discuss your radio troubles with you. Furthermore he'll always get your okay before going to work. And the good ones aren't out to take you, if the bill is going to be high, they'll warn you-and with accurate explanation, too. Then, when the job is done and you can read the tower with little if any interference, you'll enjoy that radio and begin to realize what a worthwhile hunk of equipment it is.



Dilbert

(Continued from page 39)

barging into such weather, minus know-how. Attempting to fly VFR in instrument weather is very apt to put a crimp in your standing with Lady Luck. There is only one answer-IFR. Such flights usually are more carefully planned, and tend to keep the pilot more aware of his track and ground speed through frequent position checks and ETA's over checkpoints enroute. Also, IFR flights are planned to keep your airplane clear of all obstructions, both terrain and other aircraft.

No sir, in bad weather it's not the pilot on instruments who is doing the "blind flying;" it's the one who is trying to go through visual. That's the guy who is apt to get the blind staggers.

The Wreckord—The Civil Aeronautics Board has just released another yearly aircraft accident report. If you can get hold of a copy, study it carefully; it contains a lot of pertinent information.

Briefly noted, "collision" accidents and those classified as "stall" continue to be the ones you should try hardest to avoid; together they accounted for over 70 per cent of all fatalities.

Despite everything which has been done to eliminate them, violations of Civil Air Regulations were present in over 50 per cent of the fatal accidents. In case you are interested in keeping out of this category, the major violations in these unnecessary accidents were:

- a. Reckless Flying
- b. Flying Below Minimum Altitude
- c. Students Carrying Passengers

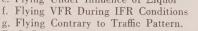
- d. Students Flying Outside of Their Prac-
- Flying Under Influence of Liquor
- P. S. If you want a copy of yearly accident report, write for "Non-Air Carrier Accident Trend Report," Bureau of Safety Investigation, CAB, Washington 25, D. C.

Night Emergencies—When his engine started cutting out during a night familiarization flight, Dilbert attempted to make it back home. He was at 2500 feet altitude at the time and had approximately 10 miles

On his way back, Dilbert frantically tried everything he knew to locate the trouble, but without success. Four miles out his engine failed completely. By this time he had lost so much altitude that it was too late to jump. There was nothing left to do but keep the plane in a full stall and hope for a clear area ahead. Striking the top of a small pine tree slowed him down some, but not enough to prevent serious injury.

There can be no criticism of the pilot's initial decision, while still at safe altitude, to try to save his airplane by returning to base. Dilbert's mistake-in this case almost a fatal one-lay in his persisting in this action beyond the point of safety, where he had lost so much altitude that a successful jump was impossible. In any emergency, don't procrastinate in arriving at a decision about jumping. Face it immediately; resolve it in your favor (considering any passengers) and act while you still have excess altitude.

Forced landings at night are extremely hazardous. When there is a choice, they should never be attempted unless exceptional circumstances such as no 'chute, knowing the terrain is favorable, or unusual visibility



Your Responsibility-A pilot invited his friend out for a joy ride in an open cockpit two-seater. Shortly after take-off, the passenger asked the pilot over the phone, "Is it all right if I loosen my safety belt?"

"Sure," replied the pilot, "make yourself comfortable.'

The passenger interpreted this to mean he could unfasten his safety belt, and did so. Ten minutes later, when the plane suddenly hit a severe downdraft at 1500 feet, it dropped out from under the flabbergasted passenger and left him sitting on his imagination in midair.

Fortunately, he recovered his senses in time to pull the rip cord. The parachute blossomed as advertised. At last reports, mutual friends vere trying in vain to patch up things between the pilot and his stillshaking passenger.

This accident may be amusing to some people, but it could very easily have been just the opposite. What if the passenger hadn't been wearing a chute; or had been hit by the horizontal stabilizer and knocked out; or if there hadn't been enough altitude for the chute to open; or if the passenger hadn't recovered his wits in time to pull the rip cord!!!

To avoid nightmares of this sort, I urge you to make sure your non-flying passengers are thoroughly indoctrinated before you take them up. They are your responsibility.



Meet the high cost of living

MAKE EXTRA MONEY

by 'phone and mail

End money worries! Make a substantial, spare-time income by telephone and mail. No door-to-door selling is necessary. Use the 'phone and mail to take care of new and renewal subscriptions for SKYWAYS magazine and all popular publications. For details, mail penny postal or send coupon now!

MAIL NOW:
Independent Agency Division
Room 1100, 640 Fifth Avenue
New York 19, N.Y.
Without obligation, please send me yo EXTRA INCOME PLAN.
271200

NAME..... STREET.....

CITY..... Zone No.... STATE

ur

... Piper Pacer

(Continued from page 49)

The nose settled on the horizon in steady flight again after one complete oscillation. Directional stability is equally good with only two oscillations required to return the nose parallel to its original flight path when displaced by a kick on the rudder, stick free. I could detect friction in the control system when quickly dropping one wing. The airplane continued to bank in the proper direction. However, when I tapped the wheel to center it after lowering a wing, positive dihedral effect was shown by the wing returning to level-flight position. When the wing was changed from level position, even to an extreme up or down one, good stability was indicated by the fact that opposite rudder picked up the low wing in a hurry.

Checking slow flight, I pulled the nose up almost 45° above the horizon. The airplane will hang in this position at cruising power without flaps, indicating 28 to 35 mph. At its most rearward c.g. (24 inches), it will stall power-off at 47 mph Indicated without flaps and 41 mph with full flaps. Aileron and rudder control through the stall is positive, with aerodynamic stall warning easier to sense in power-on stalls than power-off. At rearward c.g. loading, slight

buffeting sets in at approximately 5 mph above the stall.

Having taken along chutes for a thorough try at flying the Pacer, the next step was obviously a spin. I pulled back on the stick, kicked hard rudder and waited. Skidding giddily through the sky in this fashion, first one side then the other, try as I might, I could not get the Pacer to spin. After turning it over to Jay for a try, however, I learned that power seems to be the clue to forcing the Pacer to spin. After two fast tight turns, a normal recovery brought us level again.

Level-flight cruise affords satisfactory air visibility and the 12-pound wing loading gives a steady ride. At 2450 rpm, the Pacer will indicate 123 mph. Letting down to enter the pattern, best glide speed was 70 mph Indicated, which is well below the 85 mph do-not-exceed limit before lowering flaps.

The speed reduction is very abrupt on lowering flaps, dropping off 20 mph in a second or two and giving a definite braking effect. Checking altitude and dumping the flaps, simulating a poorly executed "go around," showed a maximum drop of 60 feet. With pilot care, dumping the flaps would bring only a 25-foot loss of altitude.

Approaching the field at 70 mph on final, I dumped flaps over the edge of the field and settled quickly. Leveling off easily, the nose came up to three-point position and of crosswind gear is not contemplated.) Jay Myers dropped me at operations and with a parting word advised me to watch him take the ship off really short. With power on, holding the brakes, the Pacer shot off within the length of the apron and kept going right on up. With a power loading of 14.4 pounds per horsepower as against the 16 pounds of the Clipper or the 18 pounds of the Cub, the Pacer can perform! The useful load in the Pacer is only 20 pounds higher than in the Clipper-its rate of climb 200 fpm higher and its ceiling

the airplane touched down at about 40 mph

Indicated, reflecting the lightly loaded con-

dition. (Fully loaded, landing speed would

be 7 or 8 miles higher.) Once on the ground,

it's there to stay with weight well back on

the tail. The rudder area makes effective

control possible and the airplane manages

nicely crosswind. (At present, installation

Standard equipment in the 125-hp model includes wiring for the Safe Flight Indicator. The instrument itself, however, is extra. Landing lights, inspection covers, navigation lights, strut fairings, dual brakes and door and window locks are optional equipment. A fixed-pitch Sensensich wood propeller is standard, with the Sensenich metal propeller or McCauley extra. Provision is also made for a 115-hp engine installation, instead of the 125 hp, if desired.

raised 3,000 feet. Range has been extended

100 miles.

A good performer, and an easy-to-fly air-

plane in general, the low-cost four-place Pacer will certainly meet with customer enthusiasm. Its flight characteristics have been designed with care and while Piper has gone far in producing an airplane that does not require exact or trained handling, it would be a still greater improvement if a feature like the "right tank for cruise" was taken care of in another way. There is evidence that not only should the hazard of fuel stoppage on take-off be engineered out of the airplane but that, further, the pilot should be relieved of the burden of any kind of fuel-tank management.* Always responsive to the wishes of their consumers, as was proven by the forthright handling of the Clipper questionnaires, this feature may be improved in the near future in keeping with the over-all built-in safety of the Piper prod-

nets. SPECIFICATIONS ON THE PA-20 "125" Lycoming O-290-D Engine Hp & rpm 125 @ 2600 Gross Weight (lbs.) 1800 Empty Weight (lbs.) 980 Useful Load (lbs.) 820 Wing Span (ft.) 29.3 Wing Area (sq. ft.) 147.5 Wing Chord (in.) 63 Length (ft.) 20.4 Height (in.) 74.3 Prop Diameter (in.) 74 Power Loading (lbs./hp) 14.4 Wing Loading (lbs.) 12.2 Baggage Capacity (lbs.) 50 Stalling Speed (mph) (flaps down) 48 Best Rate of Climb Speed (mph) 84 Rate of Climb (ft./min.) 810 Cruising Range (miles) 580 Service Ceiling (ft.) 14.250 Absolute Ceiling (ft.) 16,250 Fuel Consumption (gal./hr.) 7.7 Fuel Capacity (gal.)

* Fred Weick's "Analysis of Personal Airplane Power Plant Failures With Suggested Remedies."

OVER-THE-NOSE visibility in new Piper Pacer is very good, both on the ground and in the cir. Sensenich fixed-pitch wooden prop is standard, with metal Sensenich or McCauley as extra

